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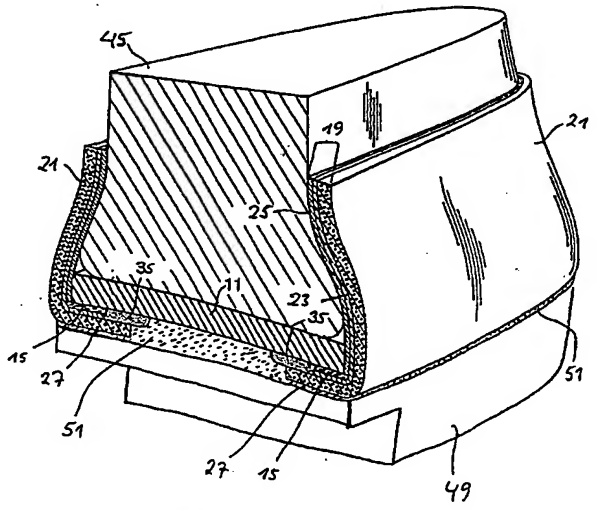
(54) Title: FOOTWEAR WITH A SEALED LASTING ALLOWANCE AND PROCESS FOR ITS PRODUCTION



(57) Abstract: Cement-lasted footwear having an upper (19), which is constructed with an outer material (21) and with a waterproof functional layer (23) arranged on the inner side of the outer material (21) and has a lasting allowance (27) on the sole side, and a sole construction which has an outsole (49) and an insole (11) with an insole underside (13) and an insole center, wherein two lasting-cement zones adjacent to one another in the direction of the center of the insole are provided, of which a first is formed with a reactive hot-melt adhesive (15) which brings about waterproofness when in the reacted state, and the second is formed with a quick-bonding fastening adhesive (35), and at least the first adhesive zone is is formed by a zone which is closed in the direction of the periphery of the insole and seals at least a part of the width of the lasting allowance (27).

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Footwear with a sealed lasting allowance and process for its production

TECHNICAL FIELD

The invention relates to cement-lasted footwear with an upper which is constructed with an outer material and with a waterproof functional layer arranged on the inner side of the outer material and has a lasting allowance on the sole side, and with a sole construction which has an outsole and an insole, the lasting allowance being cemented to the underside of the insole by means of lasting cement. Use is preferably made of a water-vapor permeable functional layer. The invention also relates to components suitable for such footwear and to a process for the production of such a shoe.

BACKGROUND OF THE INVENTION

There are shoes of which the upper is waterproof and water-vapor permeable on account of being lined with a functional layer. Such an upper remains breathable in spite of being waterproof. Special efforts are required to ensure permanent waterproofness in the region between the end of the upper on the sole side and the sole construction.

In shoes which are produced by the known cement-lasting process, the upper is cemented to a border region on the underside of the insole and an outsole is applied to the underside of this cemented unit. Weak points in this solution are the cement-lasting points between the insole and the upper.

Particularly at points at which the contour of the shoe has a small radius of curvature, folds of the lasted upper material occur in the lasting allowance. The lasting cement constitutes a weak point in particular because it either does not seal the entire transitional region between the upper and the insole from the outset, in particular in the region of the lasting folds, or may become brittle and consequently water-permeable as a result of flexural stresses during use of the shoes.

It is known from DE 40 00 156 A to arrange reactivatable sealing cement, which may be silicone or polyurethane, between the periphery of the insole and the functional layer of the upper. To prevent water which reaches the underside of the insole via the outer material of the upper and the lasting allowance from being able to get into the space inside the shoe, the insole is provided with a waterproof insole layer. There may be cases in which the separate additional step of cementing the periphery of the insole to the functional layer and the use of a waterproof insole are not desired.

EP 0 286 853 A discloses a process for sealing the lasting allowance of an upper provided with a waterproof, water-vapor permeable functional layer, in which an inner border region of the lasting allowance is kept uncemented during the cement-lasting and an injection mold with a sealing lip rising up toward the lasting allowance is placed against the underside of the lasting allowance after the lasting operation. In this case, the sealing lip essentially follows the contour of the insole border and is offset slightly toward the middle of the insole with respect to the outer peripheral contour of the outsole to be applied later. A sealing material is injected into the space formed inside the sealing lip and surrounds the border

region of the upper provided with the functional layer, left uncemented during cement-lasting, and consequently seals the said region. Although this sealing process has proved to be very successful, it requires an injection mold and an injection machine of the type mentioned.

It is known from EP 0 595 941 B to seal the lasting allowance in a shoe with an upper which has a waterproof layer and is lasted around an insole in such a way that the border of the upper region to be lasted is embedded in a waterproof material, which may be polyurethane (PU), before the lasting operation. This sealing method has also proved to be very successful, but requires the additional process step of embedding the border of the lasting allowance.

SUMMARY OF THE INVENTION

The invention is intended to provide footwear which can be made permanently waterproof with as little expenditure on machinery as possible and with as few process steps as possible, as well as footwear components suitable for such footwear and a process for the production of such footwear.

Footwear with which this object is achieved is specified in claim 1. An insole suitable for this and an upper suitable for this are specified in claims 11 and 14 respectively. Processes for the production of such footwear are specified in claims 17 and 25. Advantageous developments are specified in the dependent claims.

Footwear according to the invention comprises an upper which is constructed with an outer material and with a waterproof functional layer arranged on the inner side of the outer material and has a lasting allowance on the sole side. The footwear has a sole

construction which has an outsole and an insole. In this arrangement, two lasting-cement zones adjacent to one another in the direction of the center of the insole are provided, of which a first is formed with a reactive hot-melt adhesive which brings about waterproofness when in the reacted state, and the second is formed with a quick-bonding fastening adhesive, and at least the first adhesive zone is formed by a zone which is closed in the direction of the periphery of the insole and seals at least a part of the width of the lasting allowance.

Such footwear can be produced by means of a process with the following production steps:

An insole is placed ready. An upper is produced with an outer material and with a waterproof functional layer arranged on the inner side of the outer material. The upper is drawn over a last and over the insole in such a manner that a lasting-allowance region of the upper on the sole side extends down beyond the underside of the insole. A first closed lasting-cement zone which runs around the periphery of the insole in the vicinity of the insole border and consists of an as yet unreacted reactive hot-melt adhesive which brings about waterproofness when in the reacted state is applied to the underside of the insole. Moreover, a second lasting-cement zone which is adjacent to the first lasting-cement zone in the direction of the center of the insole and consists of a quick-bonding fastening adhesive is applied to the underside of the insole. The lasting-allowance region is lasted onto that region of the underside of the insole provided with the two lasting-cement zones.

This is a particularly simple method of sealing against moisture, for which only those process steps which are customary for cement-lasted shoes without a waterproof sole construction are required, with the

only exception that not only conventional lasting cement but also reactive hot-melt adhesive is additionally applied to the underside of the insole.

It is true that the cement-lasting could also be performed using the reactive hot-melt adhesive as the only lasting cement and this could bring about both the fastening of the lasting allowance to the underside of the insole and the sealing of the lasting allowance. Nevertheless, with the adhesives currently available, this requires compromises in most cases. Current reactive hot-melt adhesives which are particularly well-suited to sealing usually have a relatively long curing time. Footwear cement-lasted using only such a reactive hot-melt adhesive would have to remain in the cement-lasting machine for a correspondingly long time until adequate adhesive strength is achieved but this would considerably reduce the production rate in an undesirable manner. This consideration applies especially for heavy-duty shoes (climbing boots, safety shoes) with thick leather which has a strong restoring force after lasting.

There are a number of embodiments of the process according to the invention.

In a first embodiment, the reactive hot-melt adhesive and the fastening adhesive are applied to the insole simultaneously by means of different adhesive applicators after the upper has been clamped over a last and over the insole. To this end, a conventional cement-lasting machine only has to be provided with an additional adhesive applicator or the single applicator of the conventional cement-lasting machine for the application of the conventional fastening adhesive only has to be replaced with a double applicator, by means of which the reactive hot-melt adhesive and the fastening adhesive can be applied simultaneously.

In another embodiment of the process according to the invention, the reactive hot-melt adhesive and the fastening adhesive are applied to the insole before and, respectively, after the upper has been clamped over a last and over the insole. In this case, the reactive hot-melt adhesive can be applied to the insole before the latter is fastened to a last. This has the particular advantage that a conventional cement-lasting machine can be used without any modifications because, as in a conventional case, it has to serve only for application of the conventional fastening adhesive because the reactive hot-melt adhesive is already located on the insole. In this case, the insole can also be provided with the reactive hot-melt adhesive during its production.

A corresponding insole according to the invention is provided with a closed adhesive zone which is located on the underside of the insole, runs around the periphery of the insole in the vicinity of the insole border and consists of an as yet unreacted reactive hot-melt adhesive which brings about waterproofness when in the reacted state.

In another embodiment of a process according to the invention, the reactive hot-melt adhesive is not applied to the underside of the insole but to the inner side of the lasting-allowance region of the upper.

Such a process comprises the following production steps:

An insole is placed ready. An upper is produced with an outer material and with a waterproof functional layer arranged on the inner side of the outer material. The upper is drawn over a last and over the insole in such a manner that a lasting-allowance region of the upper on the sole side extends down beyond the underside of the insole. A first closed lasting-cement zone which runs around in the direction of the

periphery of the lasting-allowance region and consists of an as yet unreacted reactive hot-melt adhesive which brings about waterproofness when in the reacted state is applied to the inner side of the lasting-allowance region of the upper. A second lasting-cement zone which consists of a quick-bonding fastening adhesive is applied to the underside of the insole in such a manner that it is adjacent to the first lasting-cement zone in the direction of the center of the insole after cement-lasting of the lasting allowance. Alternatively, a second lasting-cement zone which is adjacent to the first lasting-cement zone in the direction of the border of the lasting allowance and consists of a quick-bonding fastening adhesive is applied to the inner side of the lasting-allowance region. The lasting-allowance region provided with at least the reactive hot-melt adhesive is lasted onto the underside of the insole.

In this embodiment also, both adhesives can be applied simultaneously or at different times. In the latter case, the reactive hot-melt adhesive can be applied to the lasting-allowance region before the upper is drawn over a last. This again has the advantage that a conventional cement-lasting machine can be used without any modifications because, as in a conventional case, it has to serve only for application of the conventional fastening adhesive because the reactive hot-melt adhesive is already located on the lasting-allowance region of the upper. In this case, the upper can be provided with the reactive hot-melt adhesive during its production.

A corresponding upper has a lasting-allowance region, the inner side of which is provided with a closed adhesive zone which runs around in the direction of the periphery of the lasting-allowance region and consists of an as yet unreacted reactive hot-melt

adhesive which brings about waterproofness when in the reacted state.

In one embodiment of the invention, reactive hot-melt adhesive is applied both to the underside of the insole and to the inner side of the lasting-allowance region and, preferably, in such a manner that the two hot-melt adhesive applications overlap at least partially in the lasted state of the upper.

By means of the invention, cement-lasted shoes are obtained, which can be made waterproof without the conventional cement-lasting process having to be modified. In particular, neither an injection mold nor an additional machine for introducing sealing material, nor an additional sealing adhesive bond between the peripheral border of the insole and the functional layer, nor a process step in which the free end of the lasting allowance must be encapsulated by means of a sealing material before the lasting operation can be performed are necessary in the production method according to the invention, as is the case in the state of the art considered in the introduction. Conventional cement-lasting machines can still be used without modification. This is a considerable advantage because cement-lasting machines currently in use are complicated and correspondingly expensive and, to implement the process according to the invention, conventional cement-lasting machines do not need to be replaced or rebuilt. It is necessary only to prepare the insole and/or the upper for the process according to the invention by applying reactive hot-melt adhesive before the cement-lasting operation, which can be performed using relatively simple devices or even manually without difficulty.

The method according to the invention therefore leads to low production costs for waterproof footwear not achieved by the known methods described in the

introduction, in particular in the case of heavy-duty footwear.

In one embodiment of the invention, the upper of the footwear is constructed with an upper laminate including the outer material and the functional layer.

In another embodiment of the invention, the outer material and the functional layer or a functional-layer laminate including the functional layer are formed by separate material layers, with which an outer-material upper with an outer-material lasting allowance and, respectively, a functional-layer upper with a functional-layer lasting allowance are formed. In this case, the outer-material lasting allowance can have an outer-material overhang beyond the functional-layer lasting allowance in the direction of the center of the insole and the second lasting-cement zone can be arranged on the inside of the first lasting-cement zone in the direction of the center of the insole and cover at least the width of the outer-material overhang.

For both embodiments, a laminate can be used, which has a leather layer and a functional layer and is available under the product name TOP DRY from W.L. Gore & Associates in Putzbrunn, Germany. This laminate then forms either the upper laminate including the outer material (leather) and the functional layer or the functional-layer laminate including the functional layer and the lining (leather).

Also suitable for footwear according to the invention is an upper laminate which has an outer-material layer made of a textile and a functional layer and is available under the product name Cambridge from W.L. Gore & Associates in Putzbrunn, Germany.

By using two different types of adhesive for the cement-lasting, one of which serves for sealing and

the other for fastening, it is possible to optimize the cement-lasting from various points of view.

The fastening adhesive can be selected optimally from the point of view of quick-acting, permanent and high-strength adhesive bonding, because it does not have to perform any sealing function. An important economic factor is in this respect a curing time which is as short as possible in order that a short dwell time in the cement-lasting machine is achieved for the respective shoe.

As the reactive hot-melt adhesive does not have to contribute to the adhesive strength of the cement-lasting, it can be selected optimally from the point of view of sealing, so as to prevent, with great reliability, water which reaches the lasting allowance via water-conducting outer material of the upper from getting onto the inner side of the functional layer facing away from the outer material and consequently into the space inside the shoe. This risk is particularly great if there is a highly absorbent lining material on the inner side of the functional layer. In the case of the invention, the reactive hot-melt adhesive seals the lasting allowance, including the particularly critical lasting folds, reliably and permanently with a waterproof effect even after flexural stress during walking with the footwear.

The waterproofness of a shoe can be tested using a centrifuge arrangement of the type described in US-A-5 329 807. A centrifuge arrangement described there has four swing-mounted holding baskets for holding footwear. With this arrangement, two or four shoes or boots can be tested at the same time. In this centrifuge arrangement, centrifugal forces generated by centrifuging the footwear at high speed are used for locating leaks in the footwear. Before centrifuging, the space inside the footwear is filled with water.

Absorbent material, such as blotting paper or a paper towel for example, is arranged on the outer side of the footwear. The centrifugal forces exert a pressure on the water with which the footwear is filled, with the effect that water reaches the absorbent material if the footwear has a leak.

In such a waterproofness test, the footwear is first of all filled with water. In the case of footwear with outer material which does not have adequate inherent rigidity, rigid material is arranged in the space inside the upper for stabilizing it, in order to prevent the upper from collapsing during centrifuging. In the respective holding basket there is blotting paper or a paper towel, onto which the footwear to be tested is placed. The centrifuge is then made to rotate for a specific period of time. Thereafter, the centrifuge is stopped and the blotting paper or paper towel is examined to ascertain whether it is moist. If it is moist, the footwear tested has not passed the waterproofness test. If it is dry, the footwear tested has passed the test and is classified as waterproof.

The pressure which the water exerts during centrifuging depends on the effective shoe surface area (sole inner surface area), dependent on the shoe size, on the mass of the amount of water with which the footwear is filled, on the effective centrifuging radius and on the centrifuging speed.

The production of shoes according to the invention is made particularly simple and cost-effective by using reactive hot-melt adhesive which can be thermally activated and can be induced to undergo its curing reaction by means of moisture, for example water vapor.

Expanding or foaming reactive hot-melt adhesive can also be used if it is desirable to make use of its increased volume which makes it particularly suitable

for filling cavities and penetrating into cracks or niches which frequently form in lasting folds, and in this way a particularly reliable waterproofness can be achieved. The expansion can be brought about by swirling the reactive hot-melt adhesive with a gas during application, which gas is, for example, a mixture of nitrogen and air.

Reactive hot-melt adhesives refer to adhesives which, before their reaction, consist of relatively short molecule chains with an average molecular weight in the range from approximately 3000 to approximately 5000 g/mol which, after bringing the reactive hot-melt adhesive into a state of reaction, are crosslinked to form long molecule chains and thereby cure, doing so mainly in moist atmosphere. After the crosslinking curing, they cannot be re-activated. Full reaction leads to a three-dimensional crosslinking of molecule chains. Three-dimensional crosslinking leads to particularly great protection against penetration of water into the adhesive.

Suitable for the purpose according to the invention are, for example, polyurethane reactive hot-melt adhesives, resins, aromatic hydrocarbon resins, aliphatic hydrocarbon resins and condensation resins, for example in the form of epoxy resin (EP).

Particularly preferred are polyurethane reactive hot-melt adhesives, referred to hereafter as PU reactive hot-melt adhesives.

The crosslinking reaction bringing about the curing of PU reactive hot-melt adhesive is usually brought about by moisture, for which atmospheric moisture is adequate. There are blocked PU reactive hot-melt adhesives of which the crosslinking reaction only begins after activation of the PU reactive hot-melt adhesive by means of thermal energy, so that such hot-melt adhesive can be stored in the open, i.e.

surrounded by atmospheric moisture. On the other hand, there are non-blocked PU reactive hot-melt adhesives, in which a crosslinking reaction takes place at room temperature if they are surrounded by atmospheric moisture. The latter hot-melt adhesives must be kept in such a way that they are protected from atmospheric moisture as long as the crosslinking reaction is not to take place.

In the unreacted state, both types of PU reactive hot-melt adhesives are usually in the form of rigid blocks. Before applying to the regions to be sealed, the hot-melt adhesive is heated in order to melt it and consequently make it able to be spread or applied. If non-blocked hot-melt adhesive is used, such heating must be performed with the exclusion of atmospheric moisture. If blocked hot-melt adhesive is used, this is not necessary, but it must be ensured that the heating temperature for melting the reactive hot-melt adhesive remains below the deblocking activation temperature.

In the melted state, the reactive hot-melt adhesive is in an adhesive state.

In one embodiment of the invention, PU reactive hot-melt adhesive which is constructed with blocked or capped isocyanate is used. To overcome the isocyanate blocking and consequently to activate the reactive hot-melt adhesive constructed with the blocked isocyanate, a thermal activation must be carried out. Activation temperatures for such PU reactive hot-melt adhesives lie approximately in the range from 70°C to 180°C.

In another embodiment of the invention, non-blocked PU reactive hot-melt adhesive is used. The crosslinking reaction can be accelerated by supplying heat.

In a practical embodiment of the method according to the invention, a PU reactive hot-melt

adhesive as can be obtained under the name IPATHERM S 14/242 from the company H.P. Fuller of Wells, Austria is used. In another embodiment of the invention, use is made of a PU reactive hot-melt adhesive such as that available under the name Macroplast QR 6202 from the company Henkel AG, Düsseldorf, Germany.

In one embodiment of the invention, use is made of reactive hot-melt adhesive, which may be the PU reactive hot-melt adhesive already mentioned, to which are added carbon particles, electrically conductive metal particles, or particles of other materials which have such electric conductivity that they can be heated selectively by means of microwave energy or which have such a capacity for absorption of other types of radiation, for example infrared radiation, that they can be heated selectively by means of such radiation. As a result of the energy absorption, the particles added to the reactive hot-melt adhesive are heated and bring about heating of the reactive hot-melt adhesive "from the inside out". In this process, the particles act like "heating elements" embedded in the reactive hot-melt adhesive. By means of an appropriate selection of heating energy, it is possible for other materials of the shoe construction than the reactive hot-melt adhesive to undergo no heating or only relatively little heating. The particles are, for example, in the form of fibers. The carbon particles are added to the reactive hot-melt adhesive in a proportion by weight in the range from about 0.1% to about 5%, preferably in the range from about 0.1% to about 3% and particularly preferably in a proportion by weight of 2%. Approximately the same addition amounts apply to metal particles. In an embodiment using this reactive hot-melt adhesive, such an adhesive mixture is applied to the insole or the inner side of the lasting-allowance region before the lasting operation. Cement-lasting

then takes place in an entirely conventional manner with conventional lasting cement and with an entirely conventional cement-lasting machine. The cement-lasted footwear is then subjected to activation heating, for example by means of microwave energy, ultrasound or infrared heating. This heating is determined in such a manner that heating of the carbon particles, metal particles or energy-absorbing particles of another type takes place, as a result of which the reactive hot-melt adhesive is activated and liquefied. In the case of infrared heating, it is possible to prevent, for example by the specific use of given wavelengths, more than just the reactive hot-melt adhesive being heated. By heating the reactive hot-melt adhesive by means of the embedded energy-absorbing particles, the other footwear components are consequently protected against too great heating. By means of these embedded particles, a reduction in the necessary exposure time in the heating of the reactive hot-melt adhesive can moreover be achieved.

Conventional lasting cements, for example in the form of solvent adhesive or hot-melt adhesive, both based on, polyurethane for example, are suitable for use as the fastening adhesive. Neoprene adhesives are also suitable. Solvent adhesive is an adhesive which has been made capable of adhesion by addition of evaporable solvent and cures as a result of evaporation of the solvent. Hot-melt adhesive is an adhesive, also known as a thermoplastic adhesive, which is brought into an adhesive state by heating and cures by cooling. Such an adhesive can be brought repeatedly into the adhesive state by renewed heating. Suitable thermoplastic adhesives are, for example, polyesters, polyamides and thermoplastic polyurethanes.

Particularly preferred is a functional layer which is not only water-impermeable but also water-

vapor permeable. This makes possible the production of waterproof shoes which remain breathable in spite of being waterproof.

A functional layer is regarded as "waterproof", if appropriate including the seams provided at the functional layer, if it ensures a water ingress pressure of at least $1.13 \cdot 10^4$ Pa. The material of the functional layer preferably ensures a water ingress pressure of over 10^5 Pa. The water ingress pressure must be measured here by a test method in which distilled water at 20±2°C is applied with increasing pressure to a sample of the functional layer of 100 cm^2. The pressure increase of the water is 60±1 cm of water column per minute. The water ingress pressure then corresponds to the pressure at which water appears for the first time on the other side of the sample. Details of the procedure are described in ISO standard 0811 from the year 1981.

A functional layer is regarded as "water-vapor permeable" if it has a water-vapor permeability coefficient Ret of less than 150 $m^2 \cdot Pa \cdot W^{-1}$. The water vapor permeability is tested by the Hohenstein skin model. This test method is described in DIN EN 31092 (02/94) or ISO 11092 (19/33).

Suitable materials for the waterproof, water-vapor permeable functional layer are, in particular, polyurethane, polypropylene and polyester, including polyether esters and their laminates, such as are described in the documents US-A-4 725 418 and US-A-4 493 870. Particularly preferred, however, is stretched or expanded microporous polytetrafluoroethylene (ePTFE), as is described for example in the documents US-A-3 953 566 and US-A-4 187 390, and expanded polytetrafluoroethylene provided with hydrophilic impregnating agents and/or hydrophilic layers; see, for example, the document

US-A-4 194 041. A microporous functional layer is understood to be a functional layer of which the average pore size lies between approximately 0.2 µm and approximately 0.3 µm.

The pore size can be measured with the Coulter Porometer (trade name), which is produced by Coulter Electronics, Inc., Hialeath, Florida, USA.

The Coulter Porometer is a measuring instrument which provides an automatic measurement of the pore size distributions in porous media, using the liquid displacement method (described in ASTM Standard E 1298-89).

The Coulter Porometer determines the pore size distribution of a sample by means of an increasing air pressure directed at the sample and by measuring the resultant flow. This pore size distribution is a measure of the degree of uniformity of the pores of the sample (i.e. a narrow pore size distribution means that there is little difference between the smallest pore size and the largest pore size). It is determined by dividing the maximum pore size by the minimum pore size.

The Coulter Porometer also calculates the pore size for the average flow. By definition, half the flow takes place through the porous sample through pores of which the pore size lies above or below this pore size for average flow.

If ePTFE is used as the functional layer, the reactive hot-melt adhesive can penetrate into the pores of this functional layer during the cementing operation, which leads to a mechanical anchoring of the reactive hot-melt adhesive in this functional layer. The functional layer consisting of ePTFE may be provided with a thin polyurethane layer on the side with which it comes into contact with the reactive hot-melt adhesive during the cementing operation. If PU

reactive hot-melt adhesive is used in conjunction with such a functional layer, there occurs not only the mechanical bond but also a chemical bond between the PU reactive hot-melt adhesive and the PU layer on the functional layer. This leads to a particularly intimate adhesive bonding between the functional layer and the reactive hot-melt adhesive, so that particularly durable waterproofness is ensured.

Leathers or textile materials, for example, are suitable as the outer material. The textile materials may be, for example, woven fabrics, knitted fabrics, formed fabrics, nonwoven fabrics or felt. These textile materials may be produced from natural fibers, for example from cotton or viscose, from synthetic fibers, for example from polyesters, polyamides, polypropylenes or polyolefins, or from mixtures of at least two such materials.

A lining material is usually arranged on the inner side of the functional layer. The same materials as indicated previously for the outer material are suitable as a lining material, which is often joined to the functional layer to form a functional-layer laminate. If use is made of such a functional-layer laminate, the textile layer is removed in the sealed part of the functional-layer lasting allowance or this region is left free of the textile layer from the outset.

The upper of the footwear can also be constructed with a laminate which includes the outer material, the functional layer and the lining.

The outsole of the footwear according to the invention can consist of waterproof material such as e.g. rubber or plastic, for example polyurethane, or of non-waterproof but breathable material such as in particular leather or leather provided with rubber or plastic inlays. In the case of non-waterproof outsole

material, the outsole can be made waterproof, while maintaining the breathability, by being provided with a waterproof, water-vapor permeable functional layer at least in places where the sole construction has not already been made waterproof by other measures.

The insole of the footwear according to the invention can consist of viscose, e.g. a viscose available under the trade name Texon, fleece, for example polyester fleece, to which fusible fibers may be added, leather or conglutinated leather fibers. Insoles made of such materials are water-permeable. An insole made of such a material or another material can be made waterproof by arranging a layer of waterproof material on one of its surfaces or in its interior. To this end, for example, a film with covering material V25 from the company Rhenoflex in Ludwigshafen, Germany, can be hot-transferred on. If the insole is to be not only waterproof but also water-vapor permeable, it is provided with a waterproof, water-vapor permeable functional layer which is preferably constructed using ePTFE (expanded, microporous polytetrafluoroethylene). An insole made of leather equipped with such a layer is available under the trade name TOP DRY from W.L. Gore & Associates GmbH, Putzbrunn, Germany.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in greater detail with reference to embodiments. The drawings show different production stages of the footwear according to the invention, in some cases in very diagrammatic cross-sectional views and in some cases in partly sectioned perspective views:

Fig. 1 shows a cross-sectional illustration of an insole with reactive hot-melt adhesive for a first embodiment of the invention;

Fig. 2 shows a cross-sectional illustration of an upper and the insole according to Fig. 1 after the upper has been clamped over a last and the insole during application of fastening adhesive;

Fig. 3A shows a cross-sectional illustration of the construction shown in Fig. 2 after application of the fastening adhesive;

Fig. 3B shows a perspective view of the construction according to Fig. 3A;

Fig. 4 shows a cross-sectional illustration of a construction of a second embodiment of the invention after an upper has been clamped over a last and an insole and reactive hot-melt adhesive has been applied to a lasting-allowance region of the upper;

Fig. 5 shows the construction shown in Fig. 4 during the application of fastening adhesive;

Fig. 6 shows the construction shown in Fig. 5 after the application of fastening adhesive;

Fig. 7 shows a cross-sectional illustration of a construction of a third embodiment of the invention after an upper has been clamped over a last and an insole and reactive hot-melt adhesive has been applied both to a lasting-allowance region of the upper and to the insole;

Fig. 8 shows the construction shown in Fig. 7 after the application of fastening adhesive;

Fig. 9 shows a cross-sectional illustration of a construction of a fourth embodiment of the invention after an upper has been clamped over a last and an insole during the simultaneous application of reactive hot-melt adhesive and fastening adhesive;

Fig. 10A shows a cross-sectional illustration of the construction according to Figs 3A, 6, 8 or 10 after the cement-lasting operation;

Fig. 10B shows a perspective view of the construction shown in Fig. 10A;

Fig. 10C shows a perspective view of the construction shown in Fig. 10B after the application of an outsole;

Fig. 11 shows a diagrammatic detail with reacted reactive hot-melt adhesive;

Fig. 12 shows a cross-sectional illustration of a construction of a fifth embodiment of the invention after an upper has been clamped over a last and an insole provided with reactive hot-melt adhesive during the application of fastening adhesive;

Fig. 13A shows a cross-sectional illustration of the construction shown in Fig. 12 after the application of fastening adhesive;

Fig. 13B shows a perspective view of the construction shown in Fig. 13A;

Fig. 14 shows a cross-sectional illustration of a construction of a sixth embodiment of the invention after an upper has been clamped over a last and an insole and reactive hot-melt adhesive has been applied to a lasting-allowance region of the upper;

Fig. 15 shows the construction shown in Fig. 14 during the application of fastening adhesive;

Fig. 16 shows the construction shown in Fig. 15 after the application of fastening adhesive;

Fig. 17 shows a cross-sectional illustration of a construction of a seventh embodiment of the invention after an upper has been clamped over a last and an insole and reactive hot-melt adhesive has on the one hand been

applied both to the insole and to a lasting-allowance region of the upper and fastening adhesive has on the other hand been applied to the insole;

Fig. 18 shows a cross-sectional illustration of a construction of an eighth embodiment of the invention after an upper has been clamped over a last and an insole and during simultaneous application of reactive hot-melt adhesive and fastening adhesive to the insole, and

Fig. 19 shows a cross-sectional illustration of the construction according to Fig. 13A, 16, 17 or 18 after the cement-lasting operation.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

Embodiments of the invention are described below, individual production stages being shown for the various embodiments. The individual embodiments differ in having different methods of application of reactive hot-melt adhesive and/or different upper materials and/or upper constructions.

Figures 2 to 10C show a first group of embodiments, in which the outer material, the functional layer and the lining are each formed by separate material layers or in which the outer material on the one hand and a functional-layer laminate including the functional layer and the lining on the other hand are formed by separate material layers.

Figures 12 to 19 show a second group of embodiments, in which the upper is constructed with a laminate including the outer material and the functional layer and with a lining separate from the laminate. Such a laminate including the outer material and the functional layer is available under the product

name Cambridge from W.L. Gore & Associates GmbH, Putzbrunn, Germany.

The embodiments of the invention of each of the two groups differ in the place of application of reactive hot-melt adhesive and/or in the chronological sequence of the application of reactive hot-melt adhesive and fastening adhesive.

In all the embodiments and figures, the same reference numbers are used for the same components or elements.

In connection with the first embodiment of the invention belonging to the first group, Fig. 1 shows an insole 11, to the underside 13 of which reactive hot-melt adhesive 15 has been applied, which forms a zone which is closed in the direction of the periphery of the insole in the vicinity of the peripheral border 17 of the insole.

Fig. 2 shows the insole 11 according to Fig. 1 and an upper 19 which has been drawn over a last and the insole 11, the last not being shown in this figure. A first embodiment of an upper 19 as used in the first group of embodiments is illustrated, in which the upper 19 has an outer-material upper 21, a functional-layer upper 23 arranged on the inner side of the latter, and a lining upper 25 arranged on the inner side of the functional layer. In this case, the upper 19 can be formed by separate material layers. However, the functional layer of the functional-layer upper 23 can also be part of a functional-layer laminate. The functional layer or the functional-layer laminate can be joined to the lining material of the lining upper 25 to form a laminate. An outer-material lasting-allowance region 29 has an overhang 30 with respect to a functional-layer lasting-allowance region 31.

The upper 19 has a lasting-allowance region 27 extending down beyond the underside 13 of the insole,

the outer-material upper 21 having an outer-material lasting-allowance region 29 and the functional-layer upper 23 having a functional-layer lasting-allowance region 31. The lining upper 25 ends at the underside 13 of the insole in order that sealing adhesive bonding of the functional-layer lasting-allowance region 31 to the underside 13 of the insole by means of the reactive hot-melt adhesive 15 is not impaired.

Fig. 2 shows a production stage in which fastening adhesive 35 is applied to the underside 13 of the insole of the construction of the insole 11 and the upper 19, which has been drawn over a last, by means of lasting-cement applicators 33, to be precise on the inside of and adjacent to the reactive hot-melt adhesive 15, seen in the direction toward the center of the insole. The fastening adhesive 35 is a lasting cement of conventional type and the lasting-cement applicators 33 are part of a conventional cement-lasting machine.

If no separate lining upper 25 is provided in the construction shown in Fig. 2, but a functional layer and a lining layer are joined to form a functional-layer laminate and the lining layer of the functional-layer laminate is not sufficiently or not permeable for the reactive hot-melt adhesive 15 which is liquid in the reaction-activated state, the lining layer of the functional-layer laminate has been omitted or removed in the region of the functional-layer lasting-allowance region 31, this being known as "paring" in the trade.

Figs 3A and 3B show a cross-sectional illustration and, respectively, a perspective view of the construction according to Fig. 2 after application of the fastening adhesive 35, in other words an operating stage of the cement-lasting machine (not shown), in which the lasting-cement applicators 33 have

been removed again from the underside 13 of the insole of the shoe construction which has been drawn over a last 45.

As the reactive hot-melt adhesive 15 has been applied to the underside 13 of the insole before the upper 19 is drawn over the last 45, nothing more needs to be carried out by the cement-lasting machine (not shown apart from the lasting-cement applicators 33) than in the case of a conventional cement-lasting operation as used for, for example, shoes which are not waterproof. In the case according to the invention, a conventional cement-lasting machine can therefore be used for the cement-lasting, such as the LT 102 model available from the company BUSM of Leicester, United Kingdom.

Any suitable processes can be used for the application of the reactive hot-melt adhesive 15 to the underside 13 of the insole. For example, the reactive hot-melt adhesive 15 can be applied to the underside 13 of the insole by means of a machine-operated or manually operated applicator. The reactive hot-melt adhesive can also be prefabricated in the form of bead-shaped or strip-shaped structures and applied and fastened to the underside 13 of the insole. Alternatively, the reactive hot-melt adhesive is sprayed on or spread on.

A second embodiment of the invention belonging to the first group is shown in Figs 4-6. In this embodiment, in contrast to the first embodiment, the reactive hot-melt adhesive is not applied to the underside of the insole but to the inner side of the lasting-allowance region of the upper before the cement-lasting operation. In this case, individual stages of this embodiment are illustrated only by two-dimensional diagrammatic cross-sectional views. Three-dimensional views would be very similar to the view

illustrated in Fig. 3B and would differ from Fig. 3B only in that the reactive hot-melt adhesive 15 is located not on the underside 13 of the insole but on the inner side of the lasting-allowance region 27.

Figs 4-6 show an embodiment of an upper of the type illustrated in Figs 2-3B and described in connection with these figures. Where Figs 4-6 correspond to the previous figures, the same reference numbers are used and reference is hereby made to the explanations above.

Fig. 4 shows a construction of an insole 11 and an upper 19 with a lasting-allowance region 27, which construction has been drawn over a last. The upper 19 comprises an outer-material upper 21, a functional-layer upper 23 which can be constructed with a functional-layer laminate, and a lining upper 25 which can be combined with the functional layer or the functional-layer laminate to form a common laminate. The outer-material lasting-allowance region 29 has an overhang 30 with respect to the functional-layer lasting-allowance region 31. Located on the functional-layer lasting-allowance region 31 is reactive hot-melt adhesive 15 which has been applied before the upper 19 is clamped over a last 45 (as shown in Fig. 3B) and the insole 11 and can be brought into a reactive state by activation.

Fig. 5 shows a production stage of this embodiment of the invention, in which fastening adhesive 35 serving as lasting cement is applied to the underside 13 of the insole by means of lasting-cement applicators 33, to be precise in a zone which, after the lasting operation, is situated inside and adjacent to the adhesive zone formed with the reactive adhesive 15, seen in the direction of the center of the insole. In this embodiment also, the applicators 33 are part of a cement-lasting machine (not shown) which carries out

the lasting operation immediately after application of the fastening adhesive 35.

Fig. 6 shows a production stage of this embodiment, in which the lasting-cement applicators 33 are drawn back, so that the lasting allowance 27 can be drawn in the direction of the center of the insole by means of lasting grippers (not shown) and pressed against the underside 13 of the insole, which results in the adhesive bonding shown in Figs 10A and 10B (described in greater detail below) between the lasting allowance 27 and the underside 13 of the insole. After the production stage shown in Fig. 10A has been reached, the reactive hot-melt adhesive 15 is activated, in order to start the reaction which makes it adhesive and leads to curing. Waterproofness of this shoe construction is then brought about in the manner described in connection with Figs 10A and 10B.

A third embodiment of the invention, which likewise belongs to the first group of embodiments, is shown before and, respectively, after the application of fastening adhesive 35 in Figures 7 and 8. This embodiment has an upper construction like the first two embodiments, so that the upper construction does not need to be described again here, and constitutes a modification of the first and the second embodiment in that reactive hot-melt adhesive 15a and 15b is applied to the underside 13 of the insole and, respectively, the lasting-allowance region 27 before the lasting operation. This can take place for at least one of the two reactive hot-melt adhesive applications before or after the upper 19 has been drawn over the last 45 (not shown in Figures 7 and 8) and the insole 11. The hot-melt adhesive applications are preferably positioned in such a manner that, in the lasted state of the upper 19, they overlap essentially entirely. In modifications, there is only partial overlapping or no

overlapping at all of the two hot-melt adhesive applications 15a and 15b.

Fig. 9 shows a diagrammatic cross-sectional view of a production stage of a fourth embodiment of the invention likewise belonging to the first group, in which both the fastening adhesive 35 serving as lasting cement and the reactive hot-melt adhesive 15 are not applied to the underside 13 of the insole until immediately before the lasting operation, to be precise by means of lasting-cement applicators 33 and, respectively, reactive hot-melt adhesive applicators 47.

In the embodiment of the invention shown in Fig. 9, conventional cement-lasting machines cannot be used as they are but require a modification, namely the addition of the reactive hot-melt adhesive applicators 47. In the event that the process according to the invention is to be implemented using a conventional cement-lasting machine without any modifications, it is possible to fall back on the other embodiments of the invention.

A production stage reached after the lasting operation with the four embodiments described of the first group is shown in a diagrammatic cross-sectional view in Fig. 10A and in a partly sectioned perspective view in Fig. 10B.

For the purpose of lasting, the lasting-allowance region 27, which extends down beyond the underside 13 of the insole in the manner shown in Figs 2-9 after the upper 19 has been clamped over the last 45 and the insole 11, has been gripped by means of lasting grippers (not shown) of a cement-lasting machine (not shown), drawn in the direction of the center of the insole and pressed against the underside 13 of the insole. By using a conventional lasting cement as the fastening adhesive 35, a quick secure

adhesive connection is brought about between the lasting-allowance region 27 and the underside 13 of the insole.

Water or other liquid, which creeps along the outer material, which usually conducts liquid, as far as the lasting allowance 27 and passes to the inner side of the functional layer, is prevented by the reacted reactive hot-melt adhesive 15 from penetrating into the space inside the shoe, in particular to the lining upper 25, or the lining layer, which are usually highly absorbent.

It is possible to achieve a particularly high degree of waterproofness of the sole construction if use is made of an insole 11 which consists of waterproof material or has been made waterproof, for example by means of an insole functional layer (not shown).

After completion of the lasting operation, all that remains is to apply an outsole 49 to the shoe construction obtained thus far, as is shown in the partly sectioned, diagrammatic perspective illustration in Fig. 10C. The shoe construction obtained after the lasting operation can be provided with an outsole 49 which is injection-molded or cemented onto the end of the upper on the sole side, and the underside 13 of the insole. Fig. 10C shows an example of a cemented-on outsole 49. An outsole cement 51 serves for cementing onto the lasting allowance 27 and onto the underside 13 of the insole. That region of the underside 13 of the insole not covered by the lasting allowance 27 can be filled either with outsole cement 51 or with a filler (not shown).

Fig. 11 shows a greatly enlarged two-dimensional diagrammatic illustration of a detail of a cement-lasted construction with a reactive hot-melt adhesive 15 which has been fully reacted by three-

dimensional crosslinking of molecule chains. The three-dimensionality of the crosslinking takes place by virtue of the fact that the molecule chains of the reactive hot-melt adhesive also crosslink in the third dimension (perpendicularly to the surface of the drawing and not visible in Fig. 11) in the manner illustrated for two dimensions. This leads to particularly great protection against the penetration of water into the adhesive.

The second group of embodiments includes the fifth to the eighth embodiments which are now described with reference to Figs 12-19 and differ from the first four embodiments essentially in having a different upper construction. While, in the four embodiments of the first group, the upper 19 has an outer-material layer 21, a functional-layer upper 23 and a lining upper 25 which are formed by separate material layers, or the outer material on the one hand and a functional-layer laminate including the functional layer and the lining on the other hand are formed by separate material layers, the upper 19 of the four embodiments of the second group shown in Figs 12-19 is constructed with a laminate 22 which has an outer material and a functional layer, and with a lining layer 25 which is arranged on the inner side of this laminate 22 and is either a separate material layer or a part of the laminate 22. It can be seen in Figs 12-19 that the lining layer 25 ends in the region of the underside 13 of the insole, in order that the functional layer can come into intimate adhesive contact with the reactive hot-melt adhesive 15 without hindrance from the lining layer 25.

With regard to the sites of application of reactive hot-melt adhesive 15 and fastening adhesive 35 and with regard to the chronological sequence of the application of these adhesives, of the clamping of the

upper over the last and the insole and of the lasting operation, the fifth embodiment shown in Figs 12-13B corresponds to the first embodiment shown in Figs 2-3B, the sixth embodiment shown in Figs 14-16 corresponds to the second embodiment shown in Figs 4-6, the seventh embodiment shown in Fig. 17 corresponds to the third embodiment shown in Figs 7 and 8, and the eighth embodiment shown in Fig. 18 corresponds to the fourth embodiment shown in Fig. 9. In this respect, it is possible to fall back on and refer to the descriptions above relating to the respectively corresponding embodiments, and it is not necessary to repeat the detailed description.

A construction such as is obtained with the four embodiments of the second group after the lasting operation is shown in Fig. 19. In this case, the inner side of the lasting allowance 27 of the laminate 22 including the outer material and the functional layer, which inner side faces toward the underside 13 of the insole, and consequently the functional layer are free of material of the lining layer 25 and can thus be sealed against the penetration of water or other liquids by means of the reactive hot-melt adhesive 15. The adhesive bonding of this inner side of the lasting allowance 27 to the underside 13 of the insole by means of the fastening adhesive 35 ensures a secure and quick-bonding join between the lasting allowance 27 and the insole 11.

The penetration of water or liquid to the space inside the shoe is prevented in this case also in the manner already described in connection with Figs 10A and 10B.

A perspective illustration of the cross-sectional view shown in Fig. 19 would be very similar to the perspective view in Fig. 10B and would differ

from Fig. 10B only with regard to the upper construction in the manner shown in Fig. 13B.

With regard to the state of production after an outsole has been applied to the shoe construction in Fig. 19, reference is made to the perspective illustration in Fig. 10C, in which connection differences with regard to the upper construction according to Fig. 13B are again to be taken into consideration.

In all the embodiments of the invention, the reactive hot-melt adhesive 15 is applied in such a quantity and to such an extent that, after the full reaction of the reactive hot-melt adhesive 15, a reactive hot-melt adhesive zone is formed, which is closed in the direction of the periphery of the insole and seals at least a part of the width of the functional-layer lasting-allowance region 31.

Patent Claims

1. Cement-lasted footwear having an upper (19), which is constructed with an outer material (21) and with a waterproof functional layer (23) arranged on the inner side of the outer material (21) and has a lasting allowance (27) on the sole side, and a sole construction which has an outsole (49) and an insole (11) with an insole underside (13) and an insole center, wherein two lasting-cement zones adjacent to one another in the direction of the center of the insole are provided, of which a first is formed with a reactive hot-melt adhesive (15) which brings about waterproofness when in the reacted state, and the second is formed with a quick-bonding fastening adhesive (35), and at least the first adhesive zone is formed by a zone which is closed in the direction of the periphery of the insole and seals at least a part of the width of the lasting allowance (27).

2. The footwear as claimed in claim 1, wherein the upper (19) is constructed with an upper laminate (22) including the outer material and the functional layer.

3. The footwear as claimed in claim 1, wherein the outer material and the functional layer are formed by separate material layers, with which an outer-material upper (21) with an outer-material lasting allowance (29) and, respectively, a functional-layer upper (23) with a functional-layer lasting allowance (31) are formed.

4. The footwear as claimed in claim 3, wherein the outer-material lasting allowance (29) has an outer-material overhang (30) beyond the functional-layer lasting allowance (31) in the direction of the center of the insole, and the second lasting-cement zone is arranged on the inside of the first lasting-cement zone

in the direction of the center of the insole and covers at least the width of the outer-material overhang (30).

5. The footwear as claimed in one of claims 1 to 4, wherein the reactive hot-melt adhesive (15) in the form of PU reactive hot-melt adhesive.

6. The footwear as claimed in one of claims 1 to 5, wherein the reactive hot-melt adhesive contains particles selected from a particle group including carbon particles and metal particles.

7. The footwear as claimed in one of claims 1 to 6, wherein the functional layer (23) is water-vapor permeable.

8. The footwear as claimed in one of claims 1 to 7, wherein the functional layer (23) is provided on its inner side with a textile layer (25) which is not present in the sealed part of the functional-layer lasting allowance (31).

9. The footwear as claimed in one of claims 1 to 8, wherein the insole (11) is waterproof.

10. The footwear as claimed in claim 9, wherein the insole (11) is water-vapor permeable.

11. An insole (11) for cement-lasted footwear, with a closed adhesive zone which is located on the underside (13) of the insole, runs around the periphery of the insole in the vicinity of the peripheral border (17) of the insole and consists of an as yet unreacted reactive hot-melt adhesive (15) which brings about waterproofness when in the reacted state.

12. The insole as claimed in claim 11, wherein the reactive hot-melt adhesive (15) is in the form of PU reactive hot-melt adhesive.

13. The insole as claimed in claim 11 or 12, wherein the reactive hot-melt adhesive (15) contains particles selected from a particle group including carbon particles and metal particles.

14. An upper (19) for cement-lasted footwear, with a lasting-allowance region (27), the inner side of which is provided with a closed adhesive zone which runs around in the direction of the periphery of the lasting-allowance region (27) and consists of an as yet unreacted reactive hot-melt adhesive (15) which brings about waterproofness when in the reacted state.

15. The upper as claimed in claim 14, wherein the reactive hot-melt adhesive (15) is in the form of PU reactive hot-melt adhesive.

16. The upper as claimed in claim 14 or 15, wherein the reactive hot-melt adhesive (15) contains particles selected from a particle group including carbon particles and metal particles.

17. A process for the production of cement-lasted footwear, which comprises the following production steps:

an insole (11) is placed ready;

an upper (19) is produced with an outer material (21) and with a waterproof functional layer (23) arranged on the inner side of the outer material;

the upper (19) is drawn over a last (45) and over the insole (11) in such a manner that a lasting-allowance region (27) of the upper (19) on the sole side extends down beyond the underside (13) of the insole;

a first closed lasting-cement zone which runs around the periphery of the insole in the vicinity of the peripheral border (17) of the insole and consists of an as yet unreacted reactive hot-melt adhesive (15) which brings about waterproofness when in the reacted state is applied to the underside (13) of the insole;

a second lasting-cement zone which is adjacent to the first lasting-cement zone in the direction of the center of the insole and consists of a quick-bonding fastening adhesive (35) is applied to the underside (13) of the insole;

the lasting-allowance region (27) is lasted onto that region of the underside (13) of the insole provided with the two lasting-cement zones.

18. The process as claimed in claim 17, wherein the reactive hot-melt adhesive (15) and the fastening adhesive (35) are applied to the insole (11) by means of different adhesive applicators (47, 33) after the upper (19) has been drawn over a last (45) and the insole (11).

19. The process as claimed in claim 18, wherein the reactive hot-melt adhesive (15) and the fastening adhesive (35) are applied to the insole (11) simultaneously.

20. The process as claimed in claim 18, wherein the reactive hot-melt adhesive (15) and the fastening adhesive (35) are applied to the insole (11) before and, respectively, after the upper (19) has been clamped over a last (45) and over the insole (11).

21. The process as claimed in claim 20, wherein the reactive hot-melt adhesive (15) is applied to the insole (11) before the latter is fastened to a last (45).

22. The process as claimed in one of claims 17 to 21, wherein the upper (19) is produced with an upper laminate (22) including the outer material and the functional layer.

23. The process as claimed in one of claims 17 to 21, wherein the upper (19) is produced with an outer material (21) and with a functional layer (23) which form separate material layers and have an outer-material lasting allowance (29) and, respectively, a functional-layer lasting allowance (31).

24. The process as claimed in claim 23, wherein the outer-material lasting allowance (29) is provided with an outer-material overhang (30) beyond the functional-layer lasting allowance (31) and the reactive hot-melt

adhesive (15) is applied to the underside (13) of the insole in the vicinity of the peripheral border (17) of the insole.

25. A process for the production of cement-lasted footwear, which comprises the following production steps:

an insole (11) is placed ready;

an upper (19) is produced with an outer material (21) and with a waterproof functional layer (23) arranged on the inner side of the outer material (21);

the upper (19) is drawn over a last (45) and over the insole (11) in such a manner that a lasting-allowance region (27) of the upper (19) on the sole side extends down beyond the underside (13) of the insole;

a first closed lasting-cement zone which runs around in the direction of the periphery of the lasting-allowance region (27) and consists of an as yet unreacted reactive hot-melt adhesive (15) which brings about waterproofness when in the reacted state is applied to the inner side of the lasting-allowance region (27) of the upper (19);

a second lasting-cement zone which consists of a quick-bonding fastening adhesive (35) is applied to the underside (13) of the insole in such a manner that it is adjacent to the first lasting-cement zone in the direction of the center of the insole after cement-lasting of the lasting allowance (27);

the lasting-allowance region (27) provided with the reactive hot-melt adhesive (15) is lasted onto the underside (13) of the insole.

26. The process as claimed in claim 25, wherein reactive hot-melt adhesive (15) is additionally applied to the underside (13) of the insole.

27. The process as claimed in claim 25 or 26, wherein fastening adhesive (35) is additionally applied to the lasting-allowance region (27).

28. The process as claimed in one of claims 25 to 27, wherein the reactive hot-melt adhesive (15) and the fastening adhesive (35) are applied by means of different adhesive applicators (47, 33) after the upper (19) has been clamped over a last (45) and the insole (11).

29. The process as claimed in one of claims 25 to 28, wherein the reactive hot-melt adhesive (15) and the fastening adhesive (35) are applied simultaneously.

30. The process as claimed in one of claims 25 to 27, wherein the reactive hot-melt adhesive (15) and the fastening adhesive (35) are applied before and, respectively, after the upper (19) has been clamped over a last (45) and the insole (11).

31. The process as claimed in claim 30, wherein the reactive hot-melt adhesive (15) is applied to the inner side of the lasting-allowance region (27) before the upper (19) is clamped over a last (45) and the insole (11).

32. The process as claimed in one of claims 25 to 31, wherein the upper (19) is produced with an upper laminate (22) including the outer material and the functional layer.

33. The process as claimed in one of claims 25 to 31, wherein the upper (19) is produced with an outer material (21) and with a functional layer (23) which form separate material layers and have an outer-material lasting allowance (29) and, respectively, a functional-layer lasting allowance (31).

34. The process as claimed in claim 33, wherein the outer-material lasting allowance (29) is provided with an outer-material overhang (30) beyond the functional-layer lasting allowance (31) and the reactive hot-melt adhesive (15) is applied to the underside (13) of the insole in the vicinity of the peripheral border (17) of the insole.

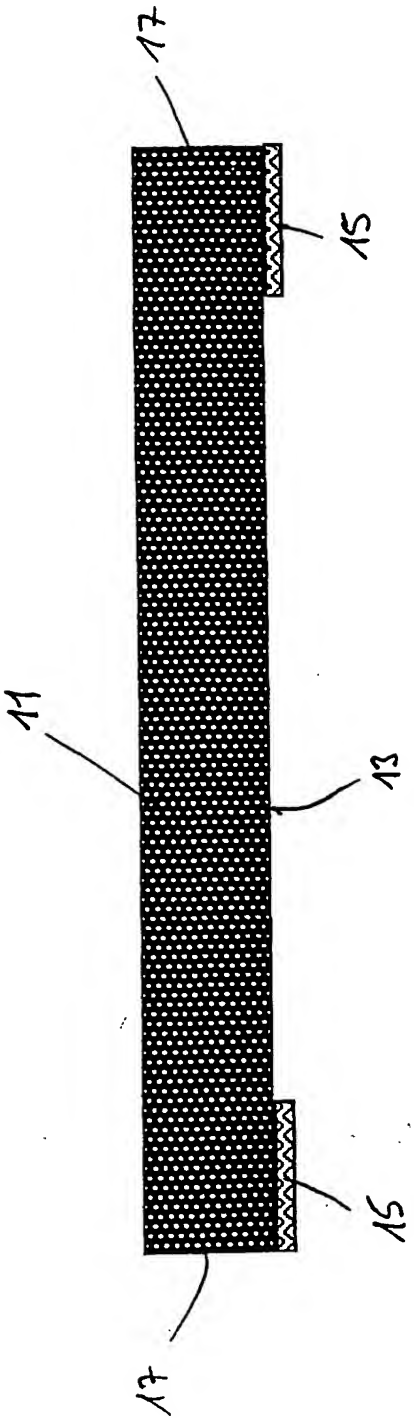


FIG. 1

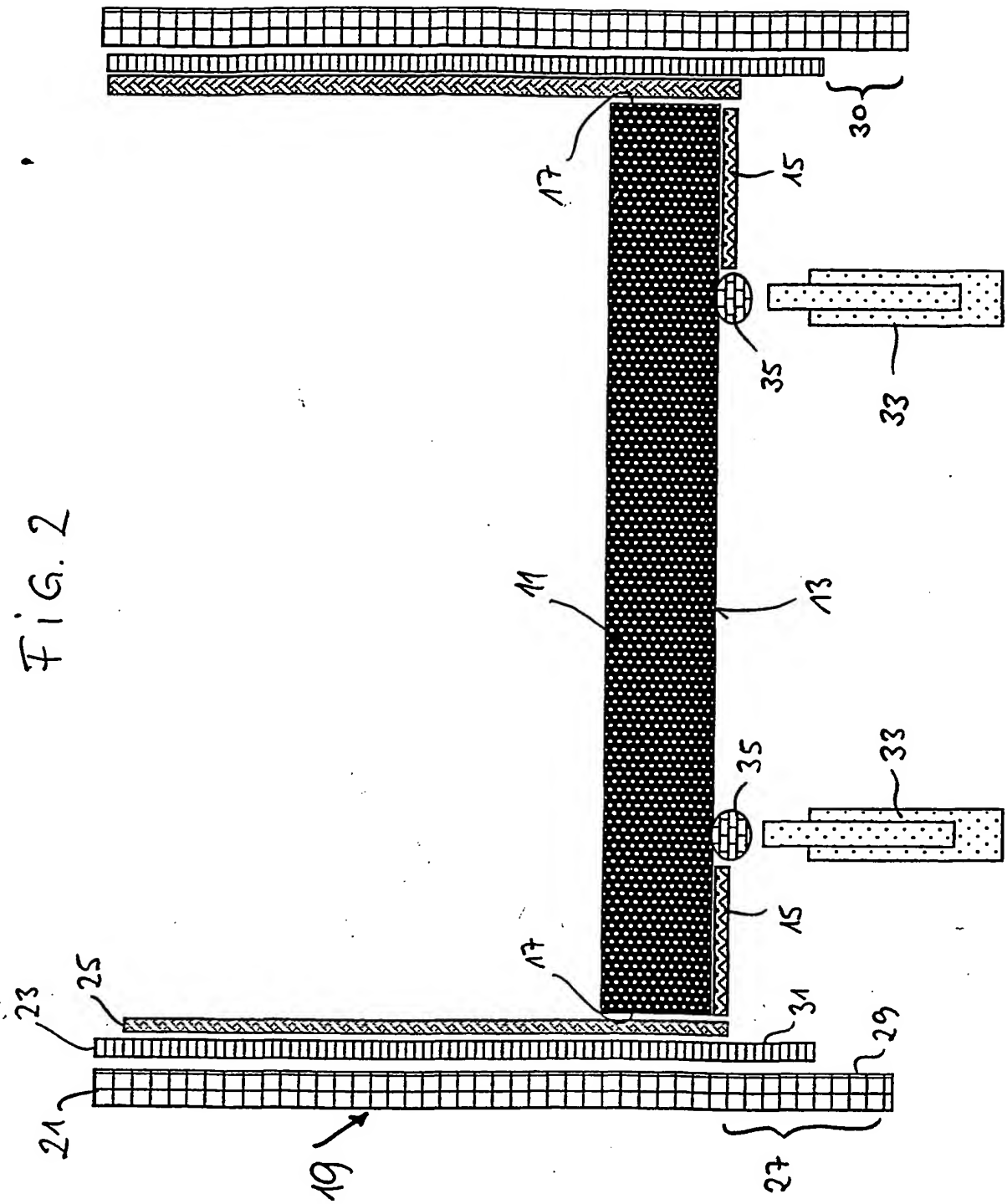


FIG. 2

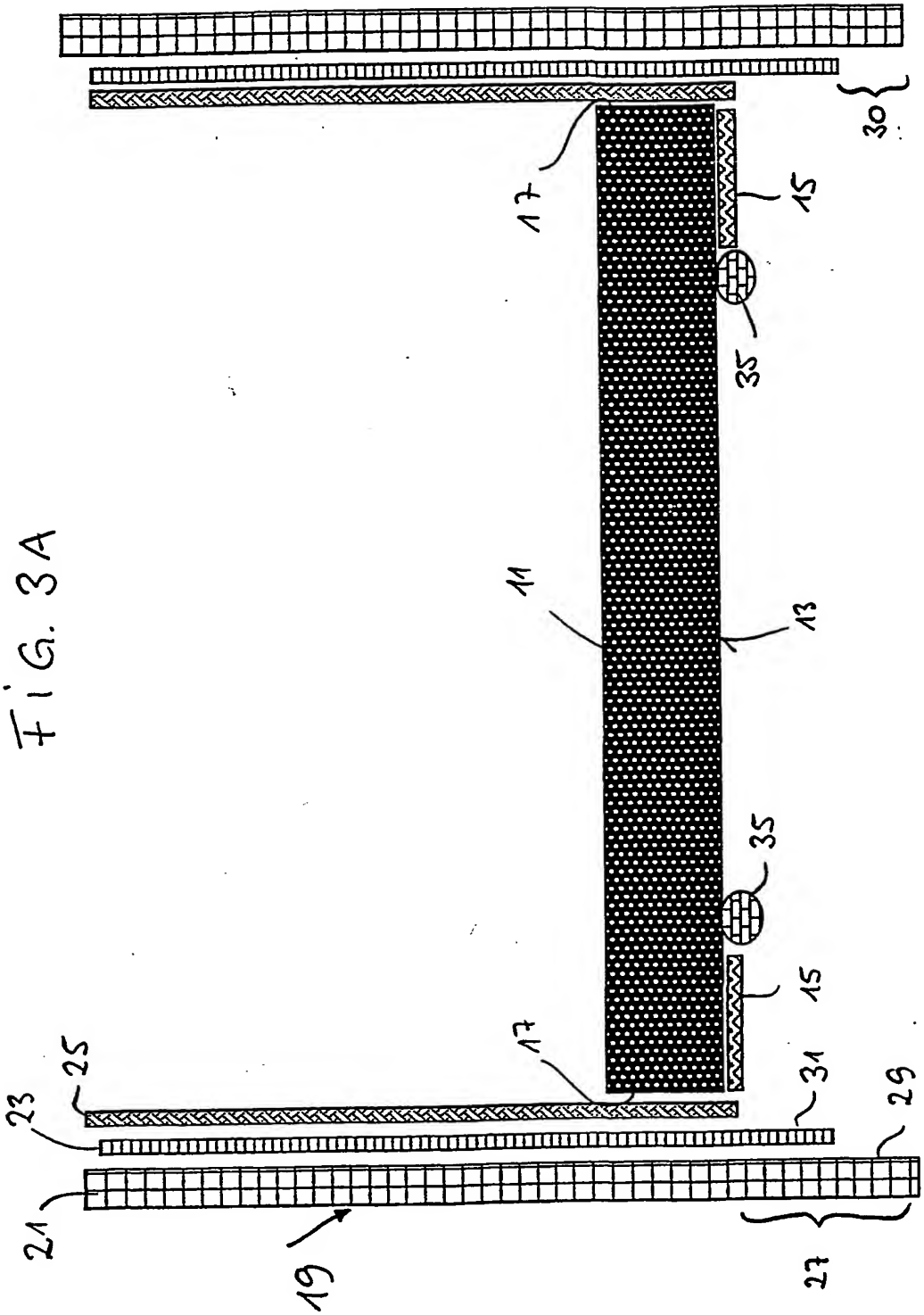


FIG. 3A

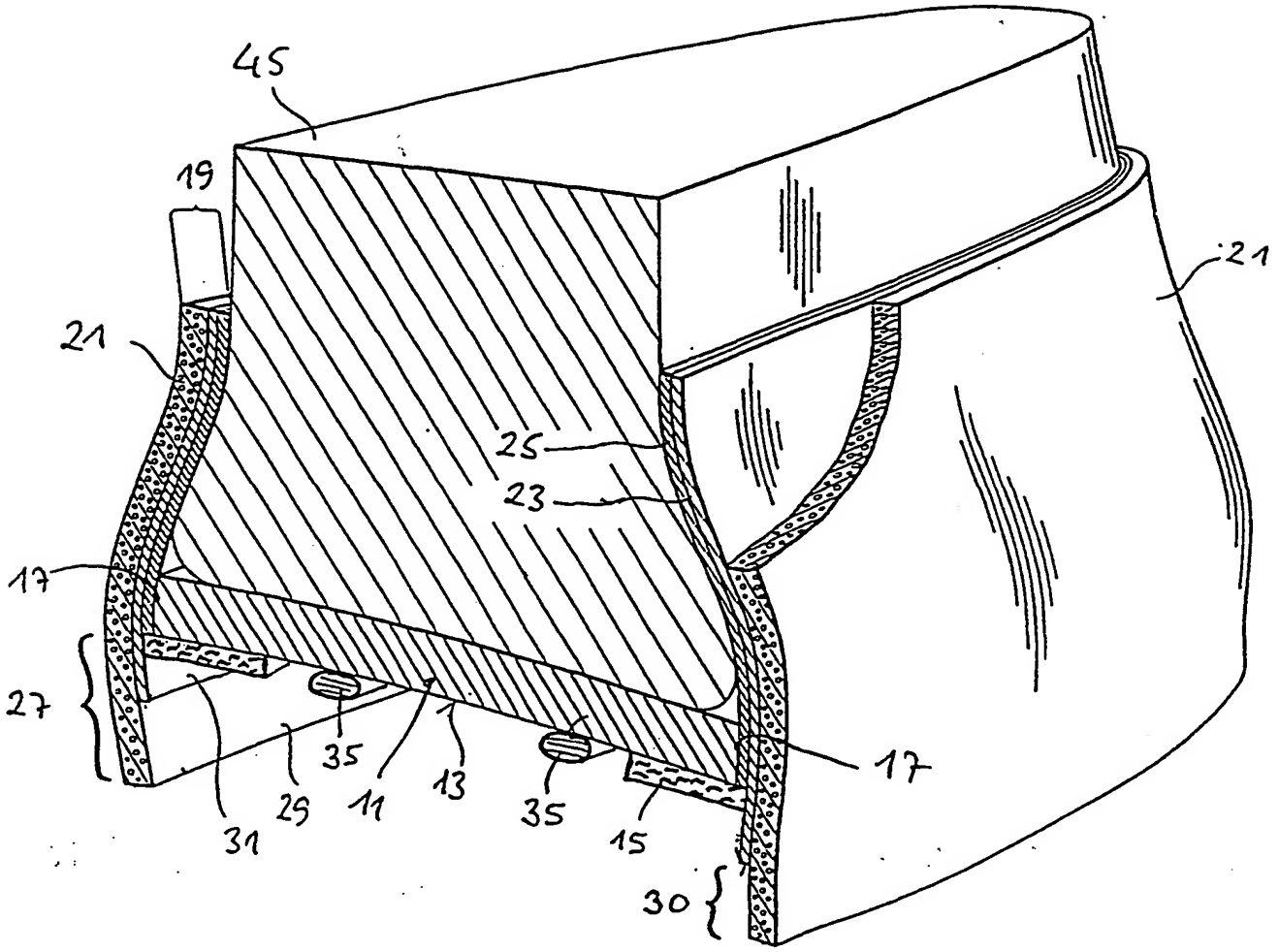


FIG. 3B

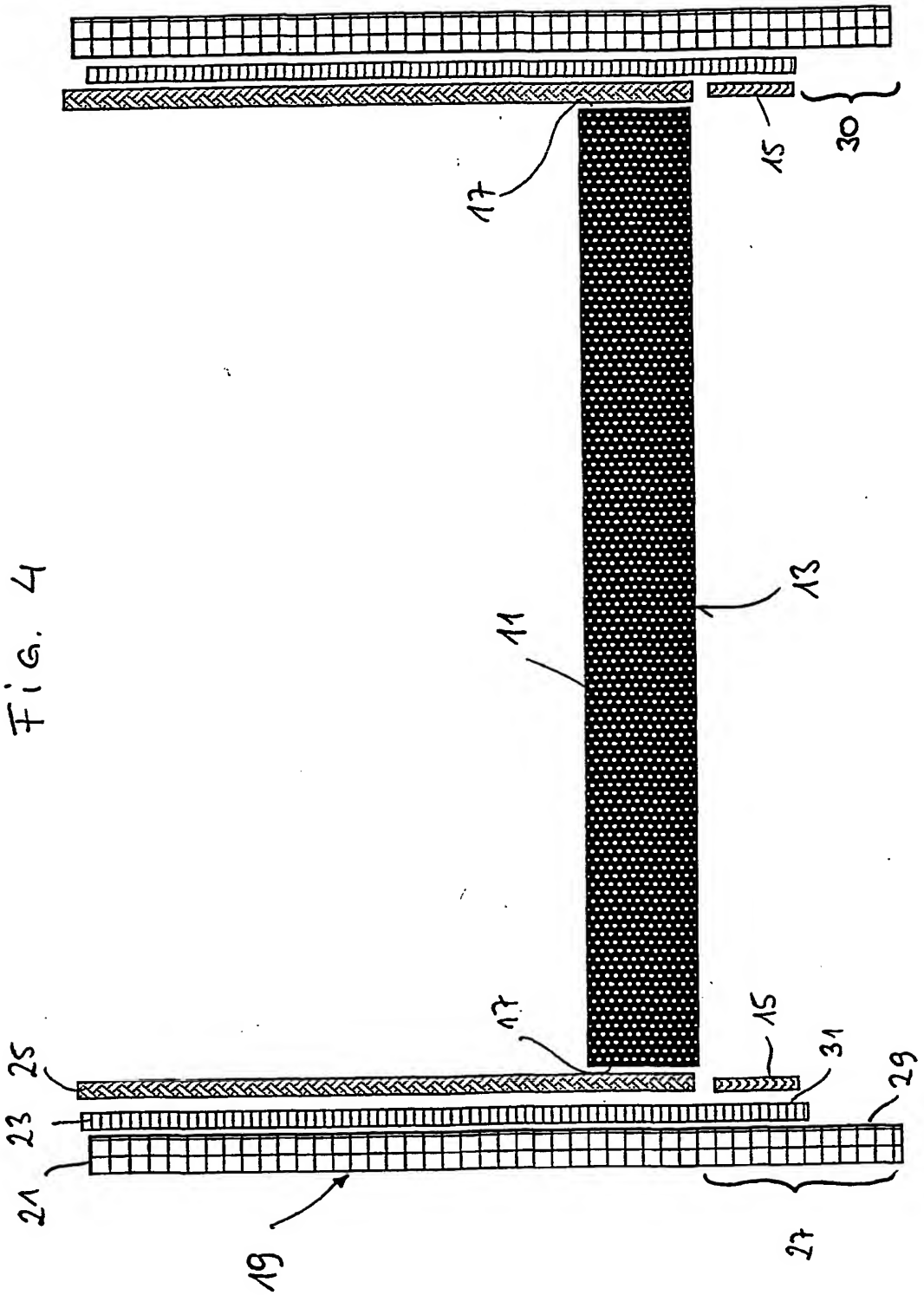


Fig. 4

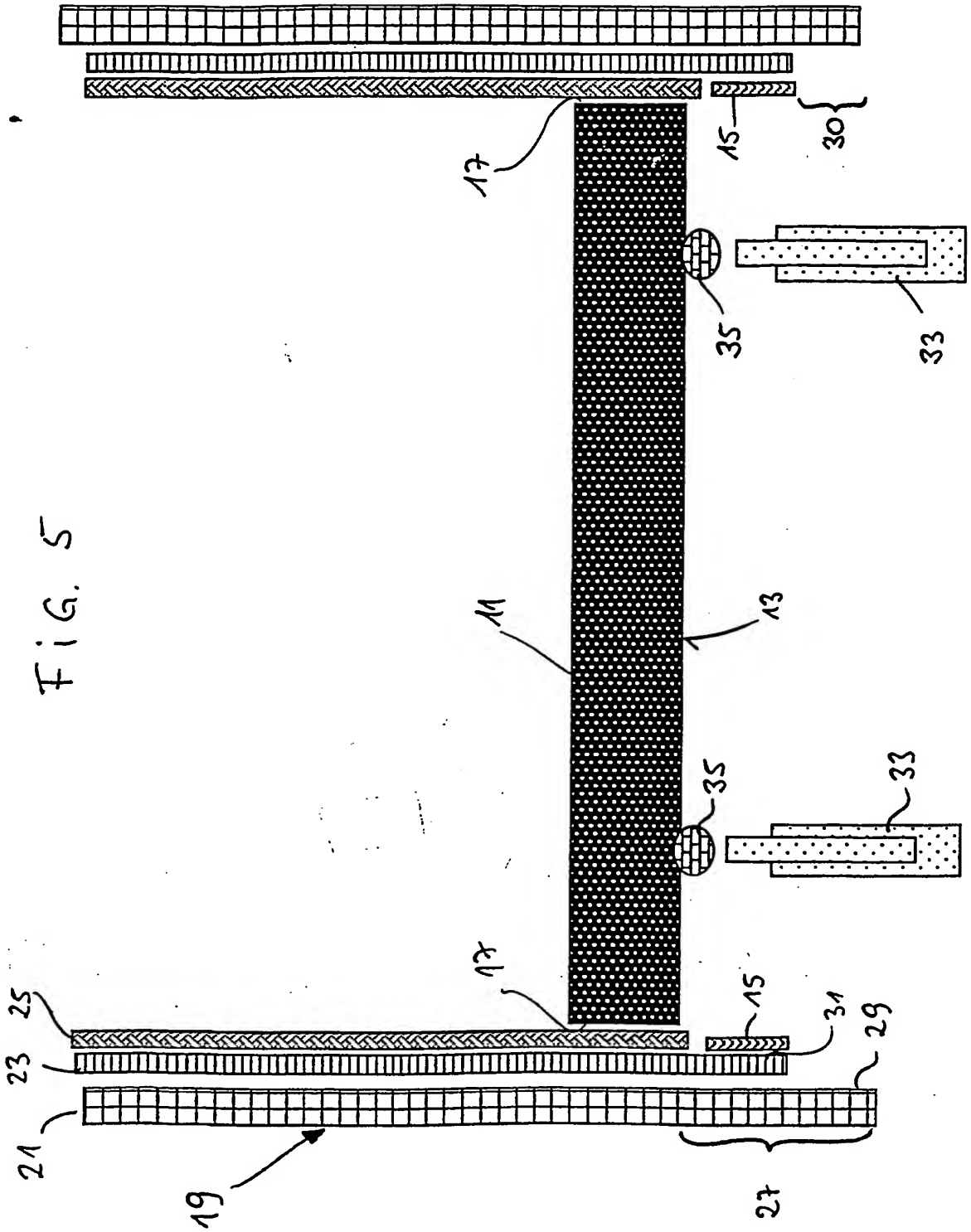


FIG. 5

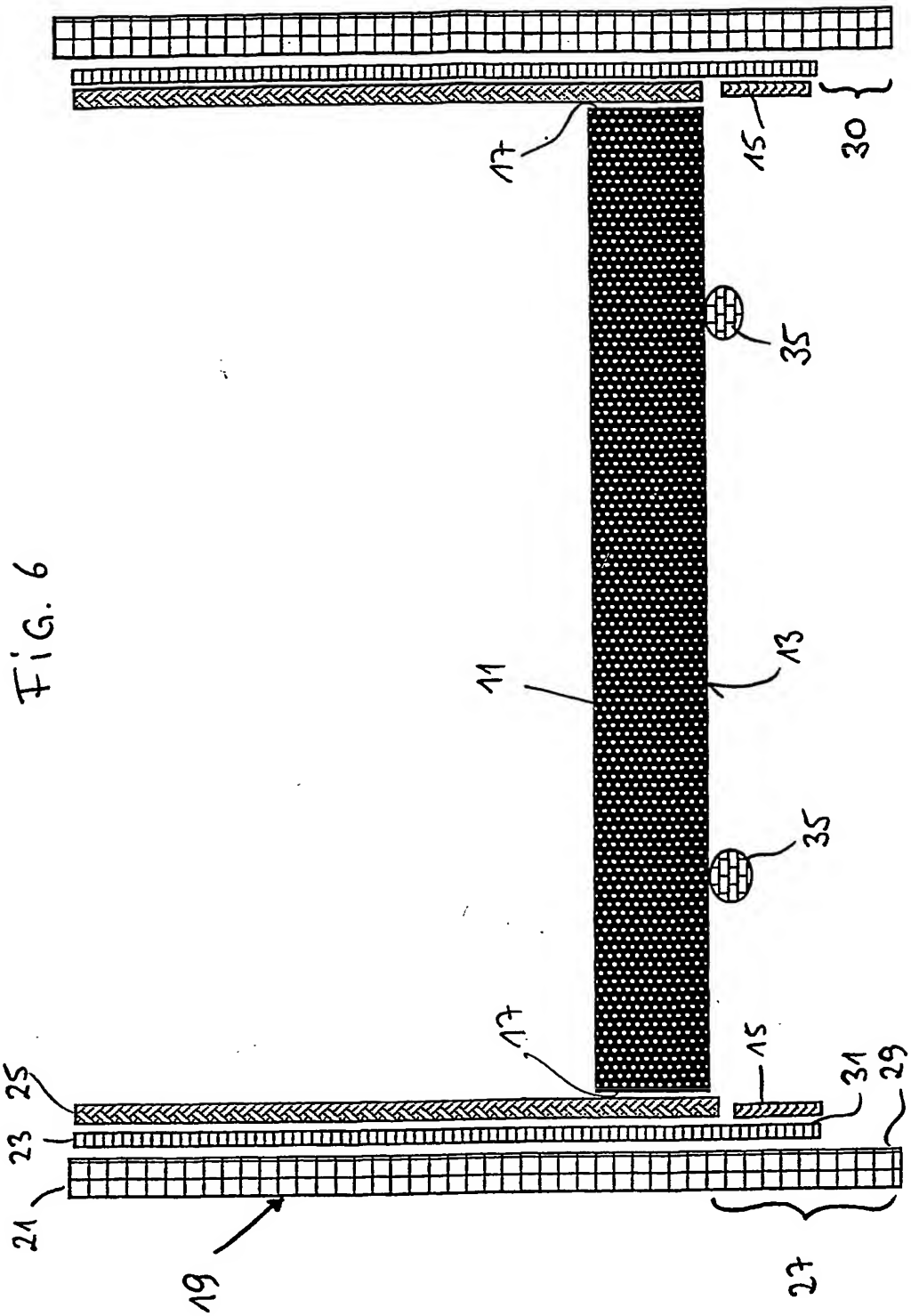


FIG. 6

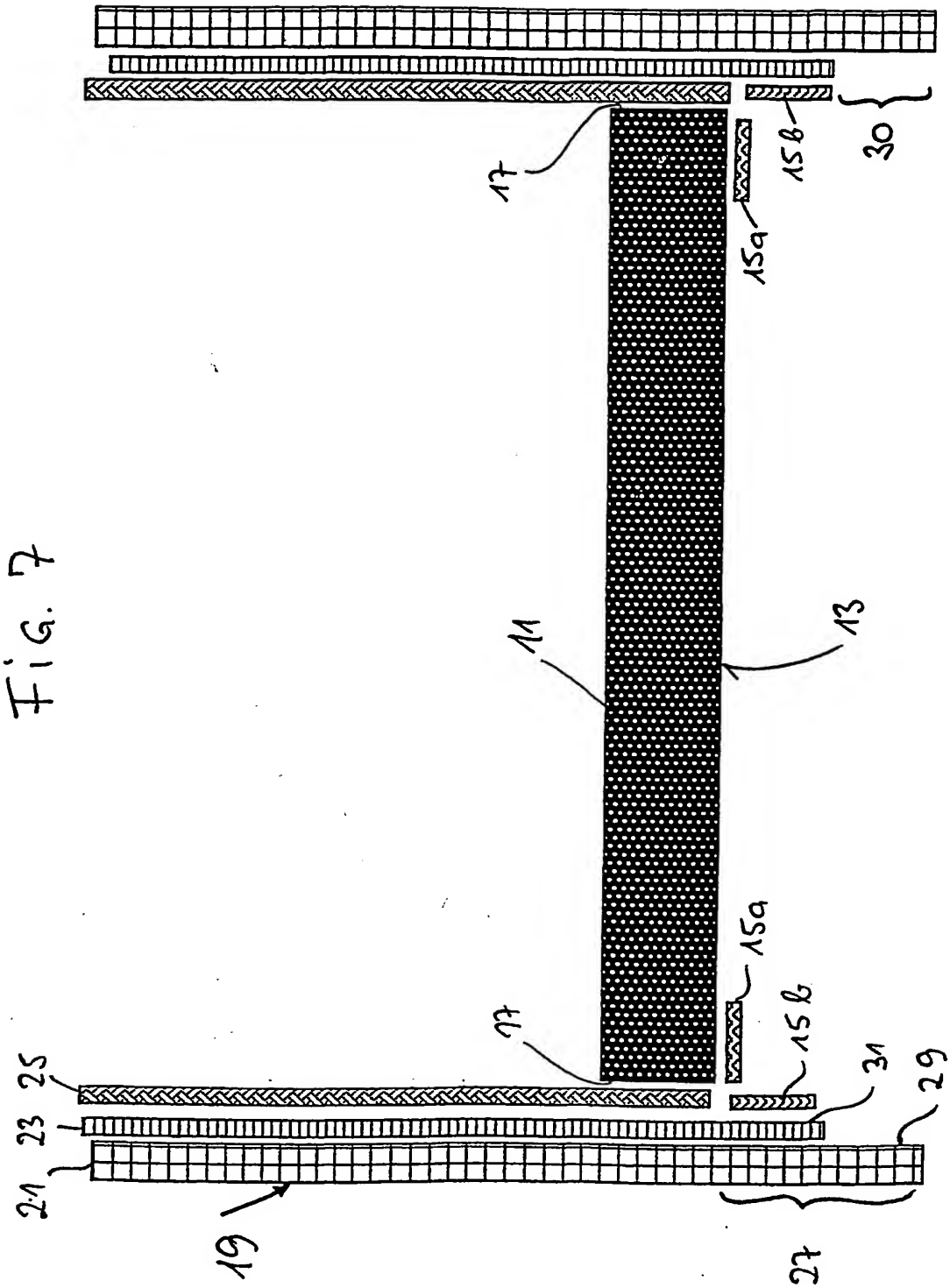


Fig. 7

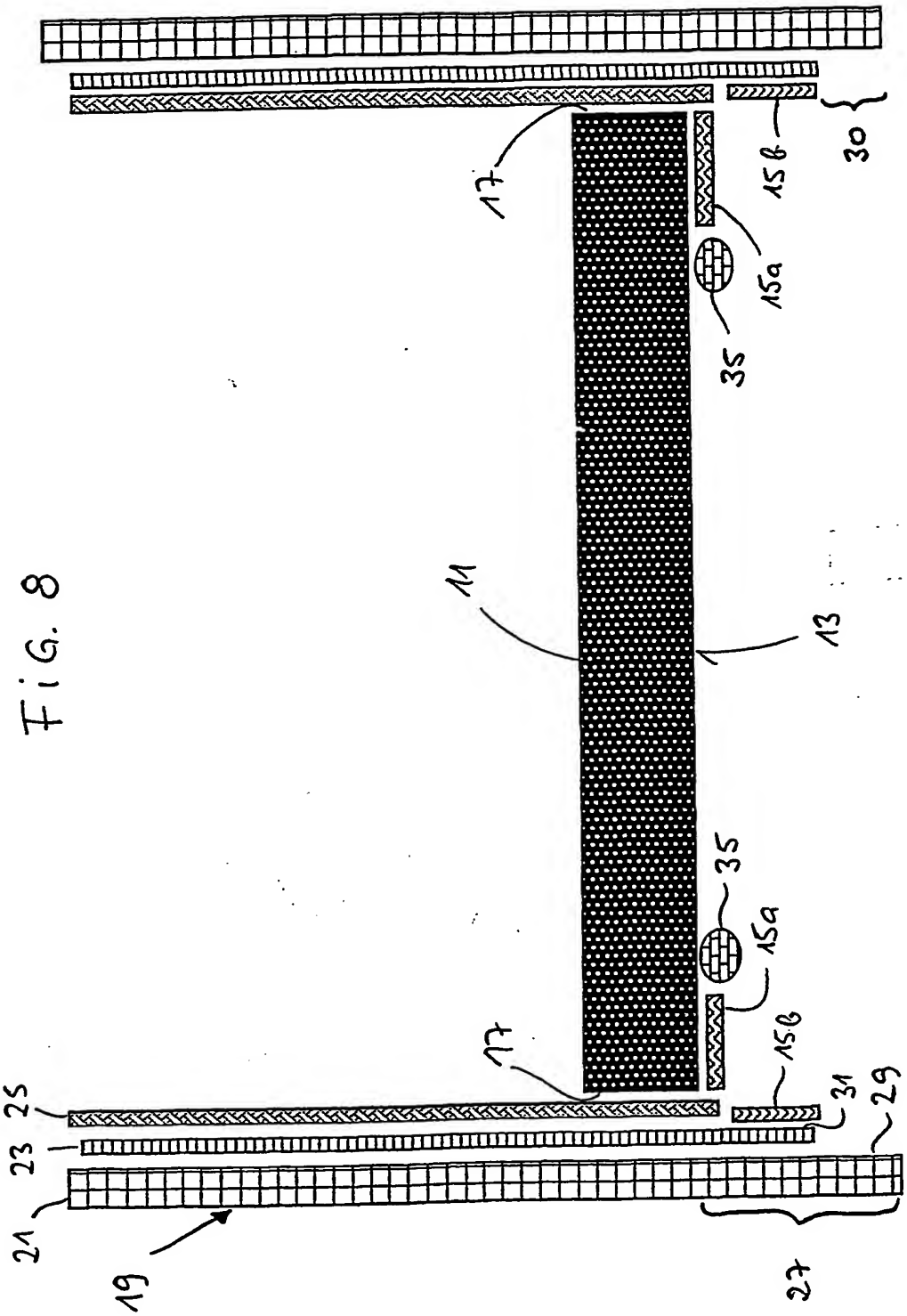


Fig. 8

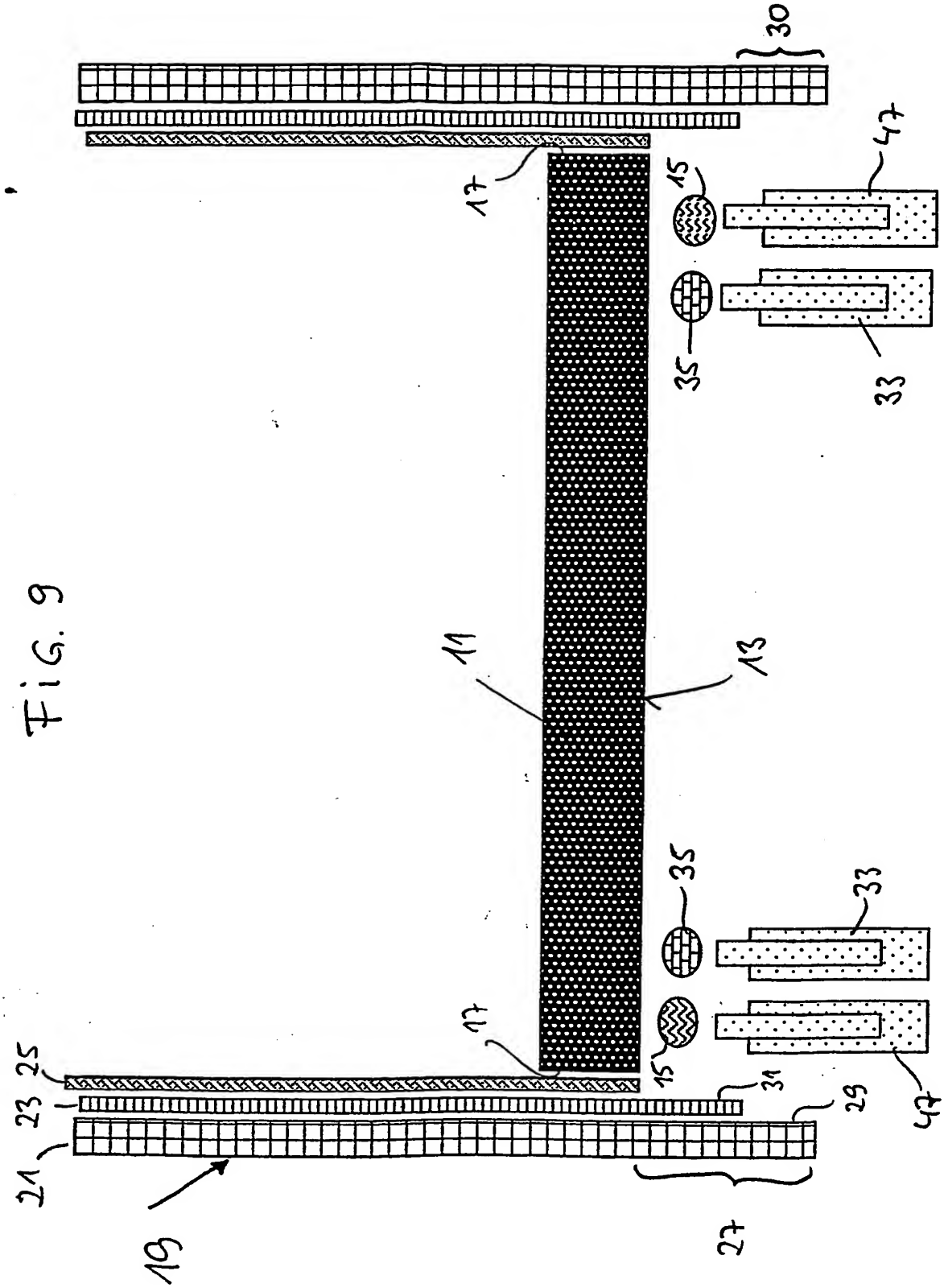


Fig. 9

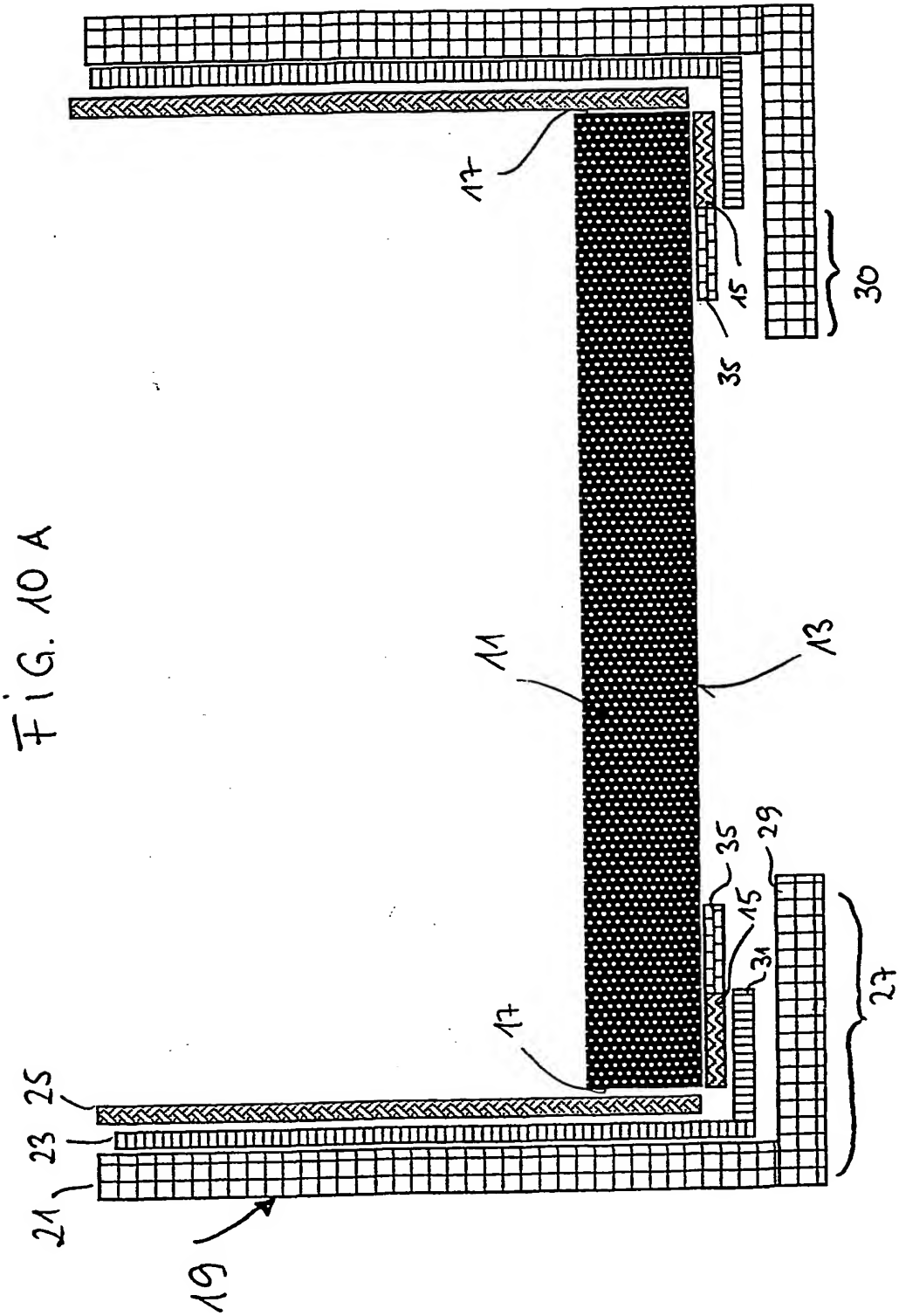


FIG. 10 A

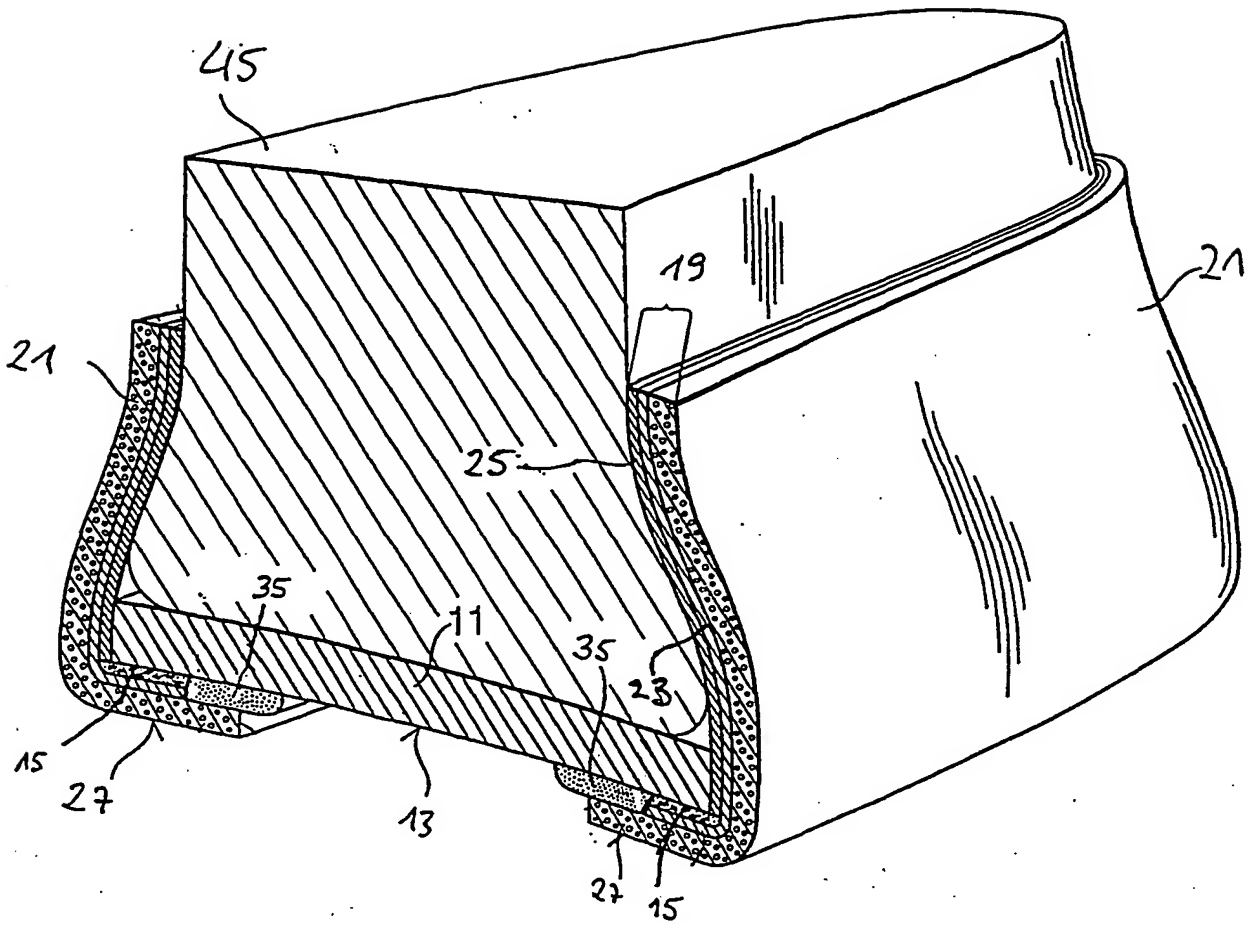


FIG. 10B

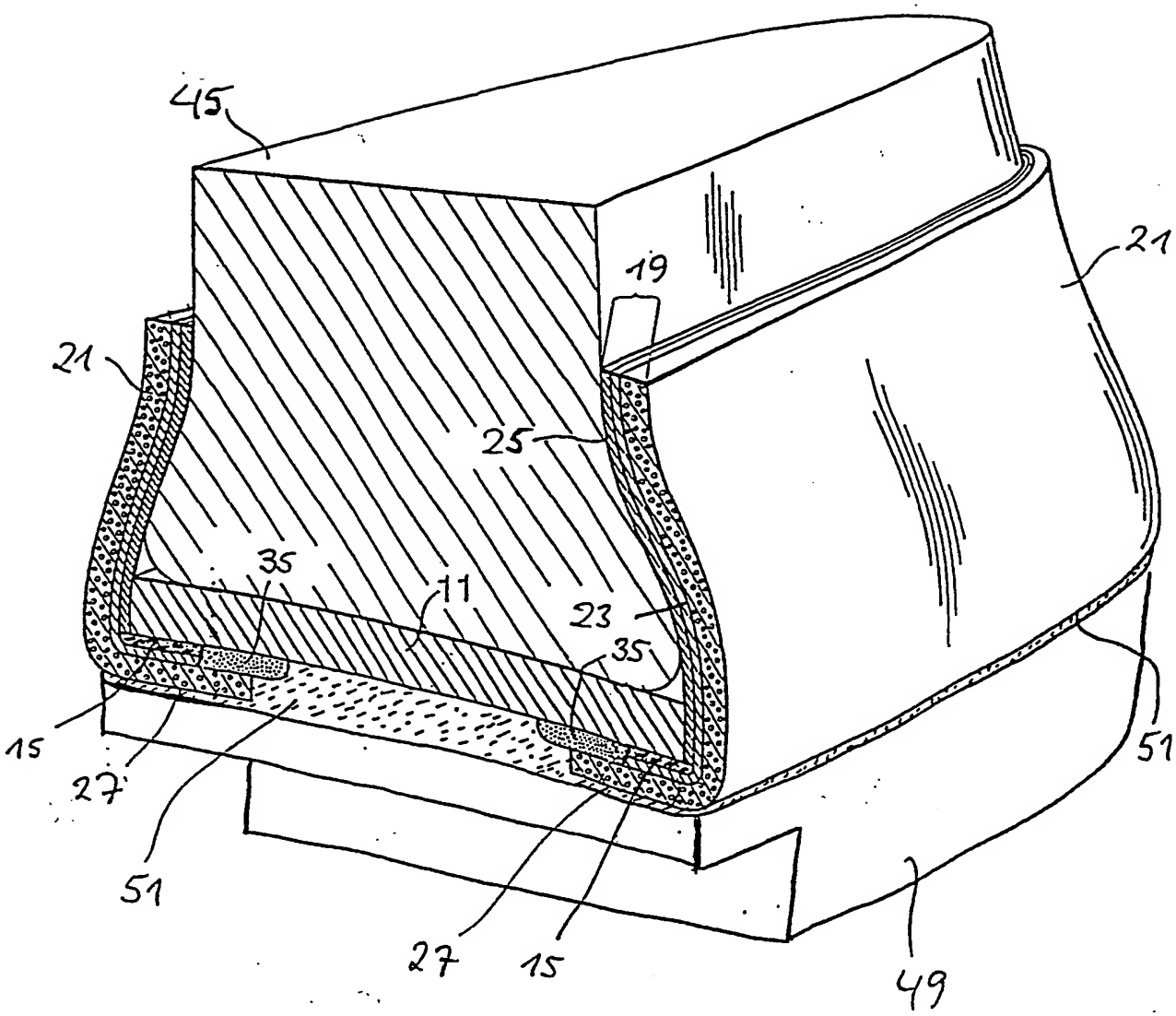


Fig. 10C

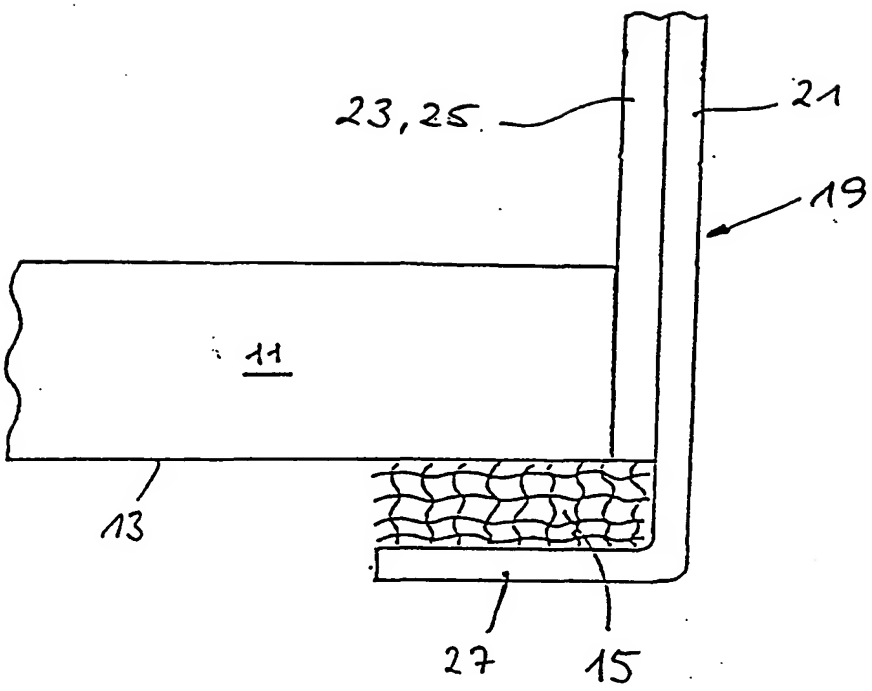


FIG. 11

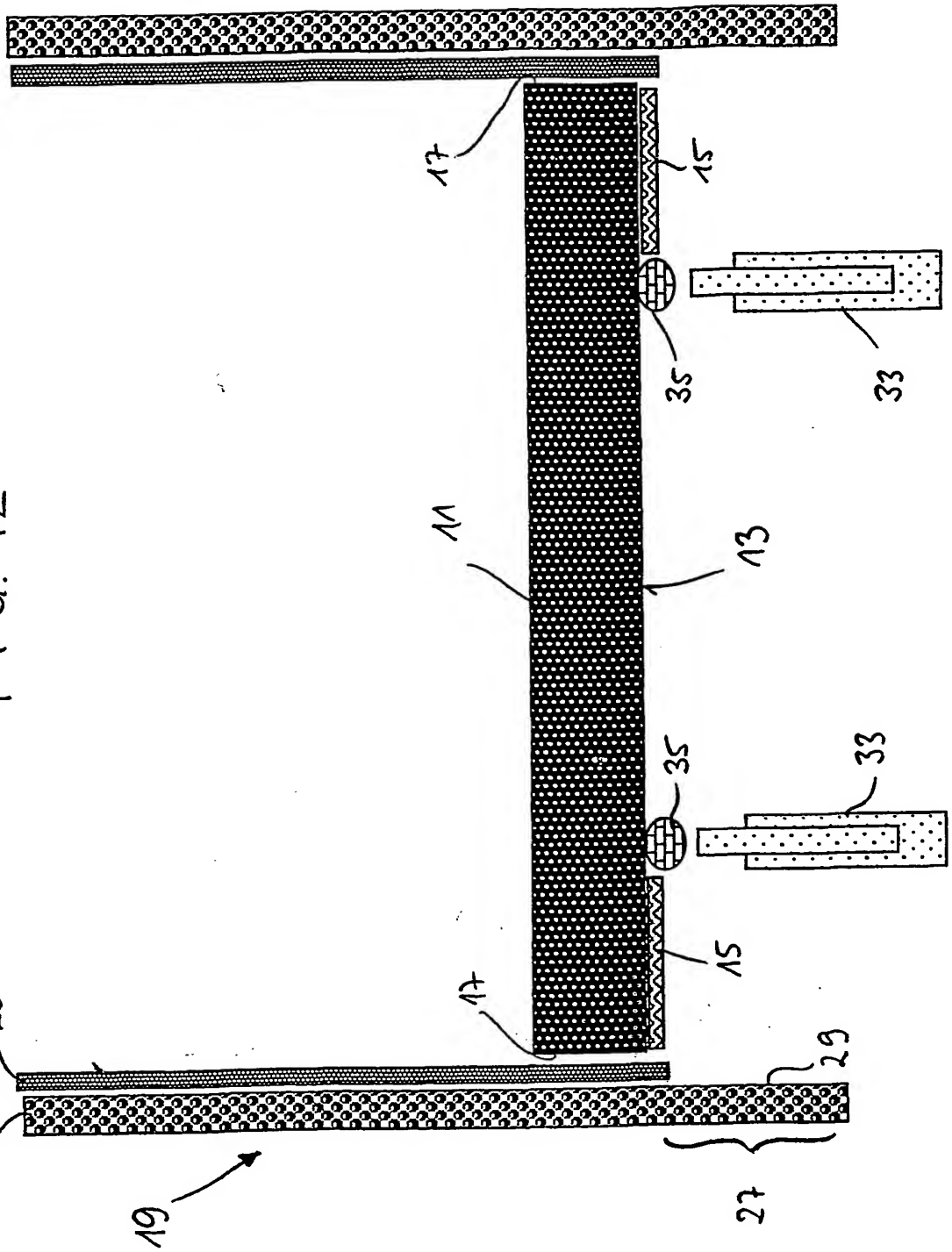
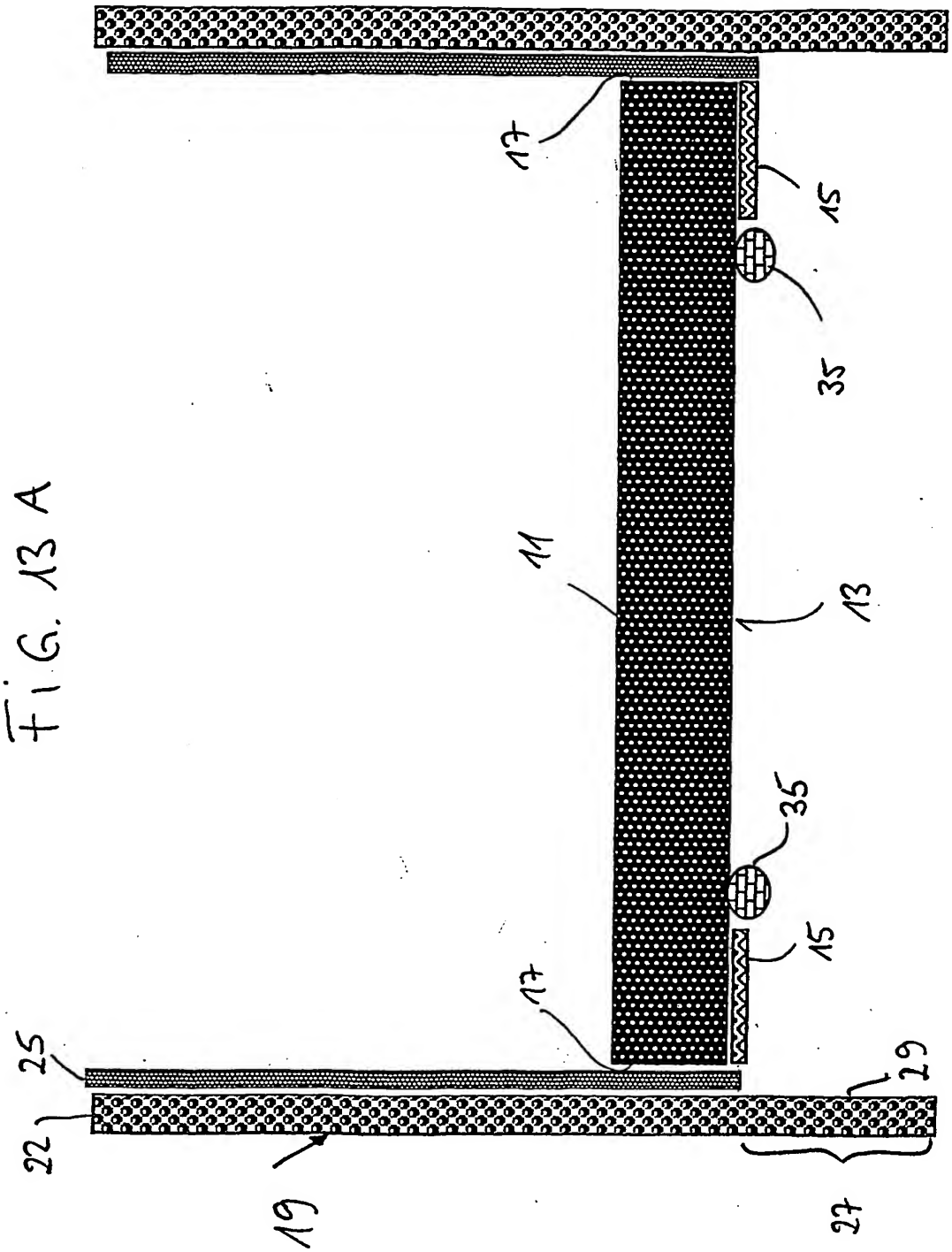


Fig. 12

FIG. 13A



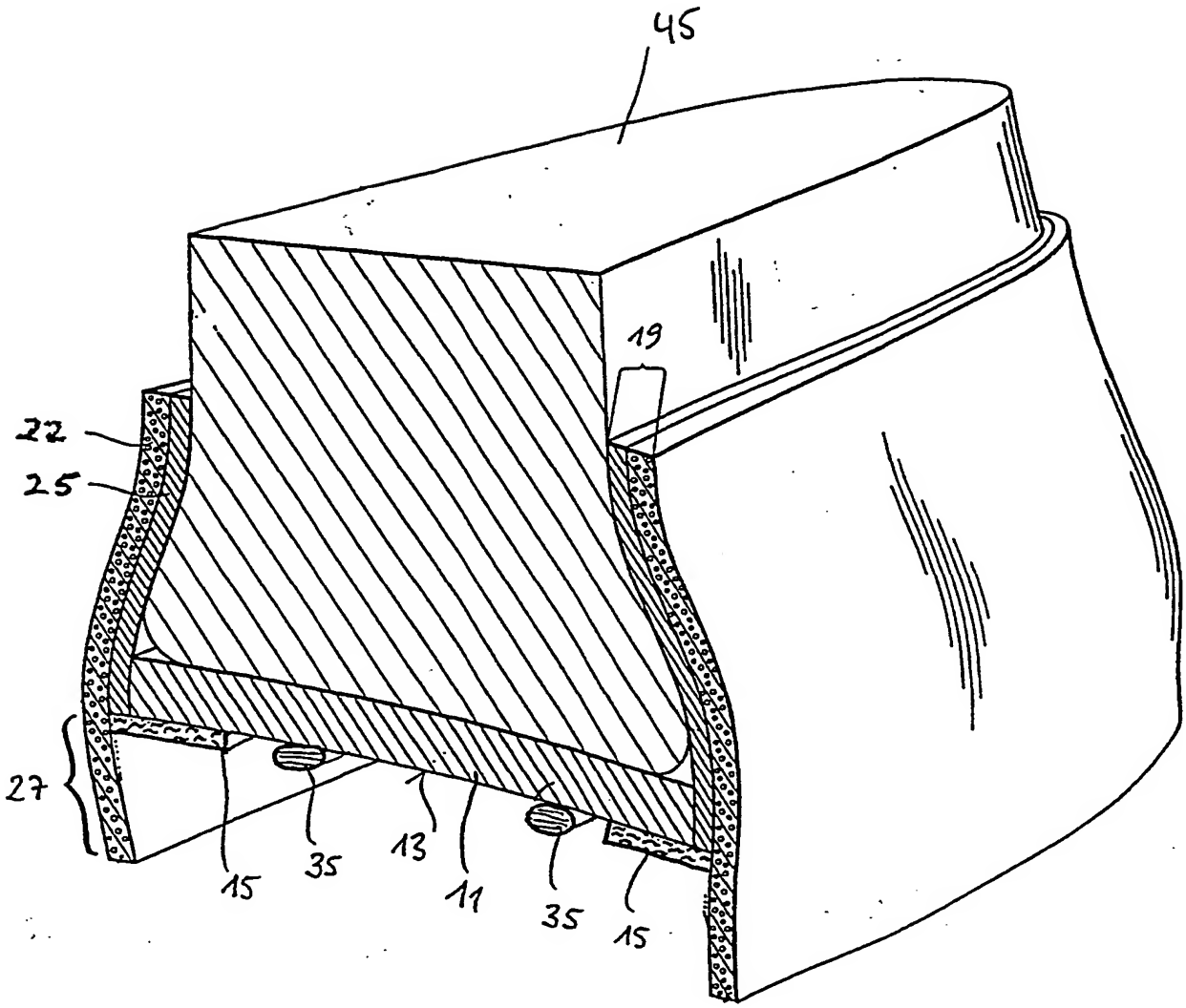


FIG. 13 B

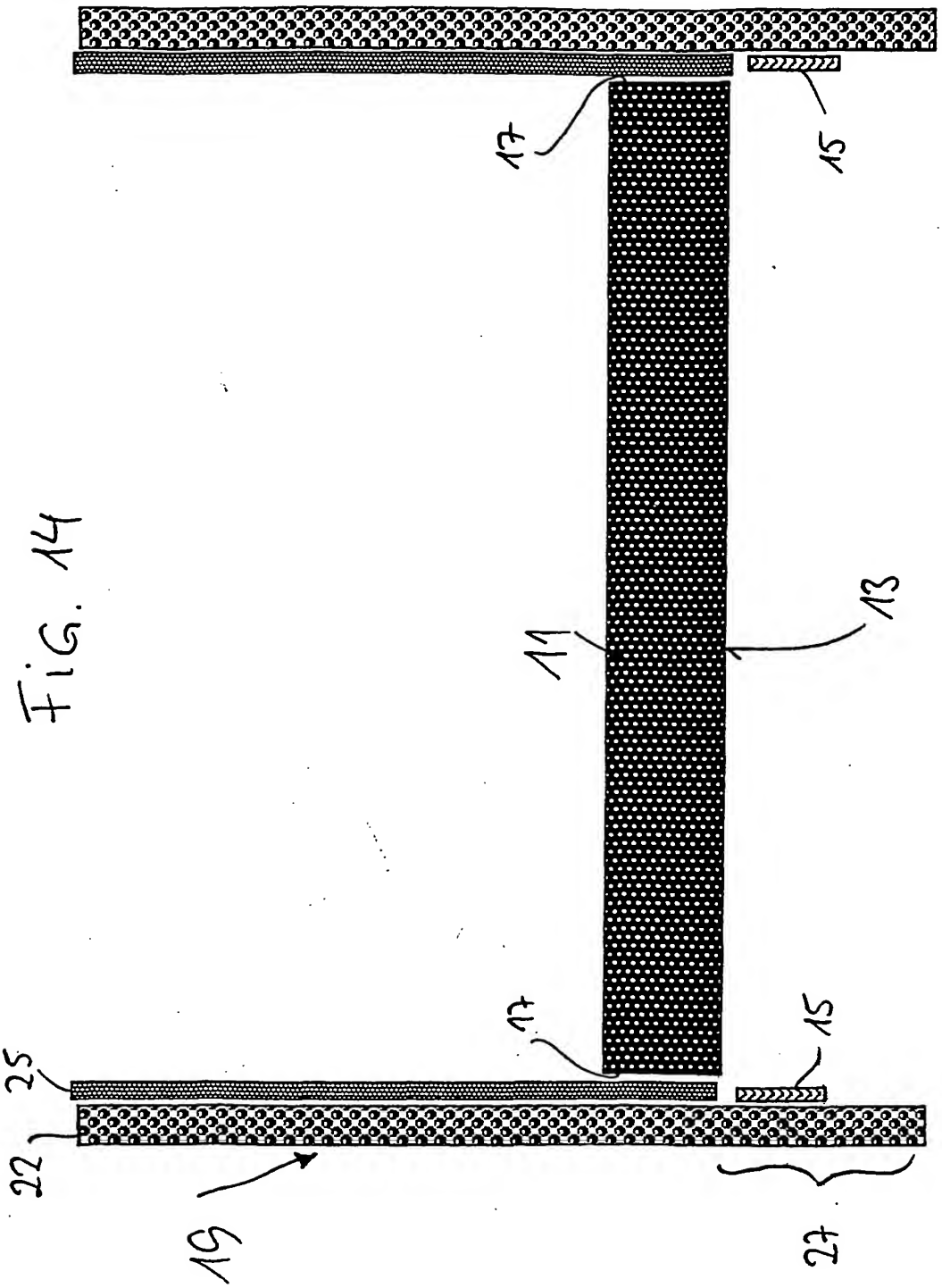


FIG. 14

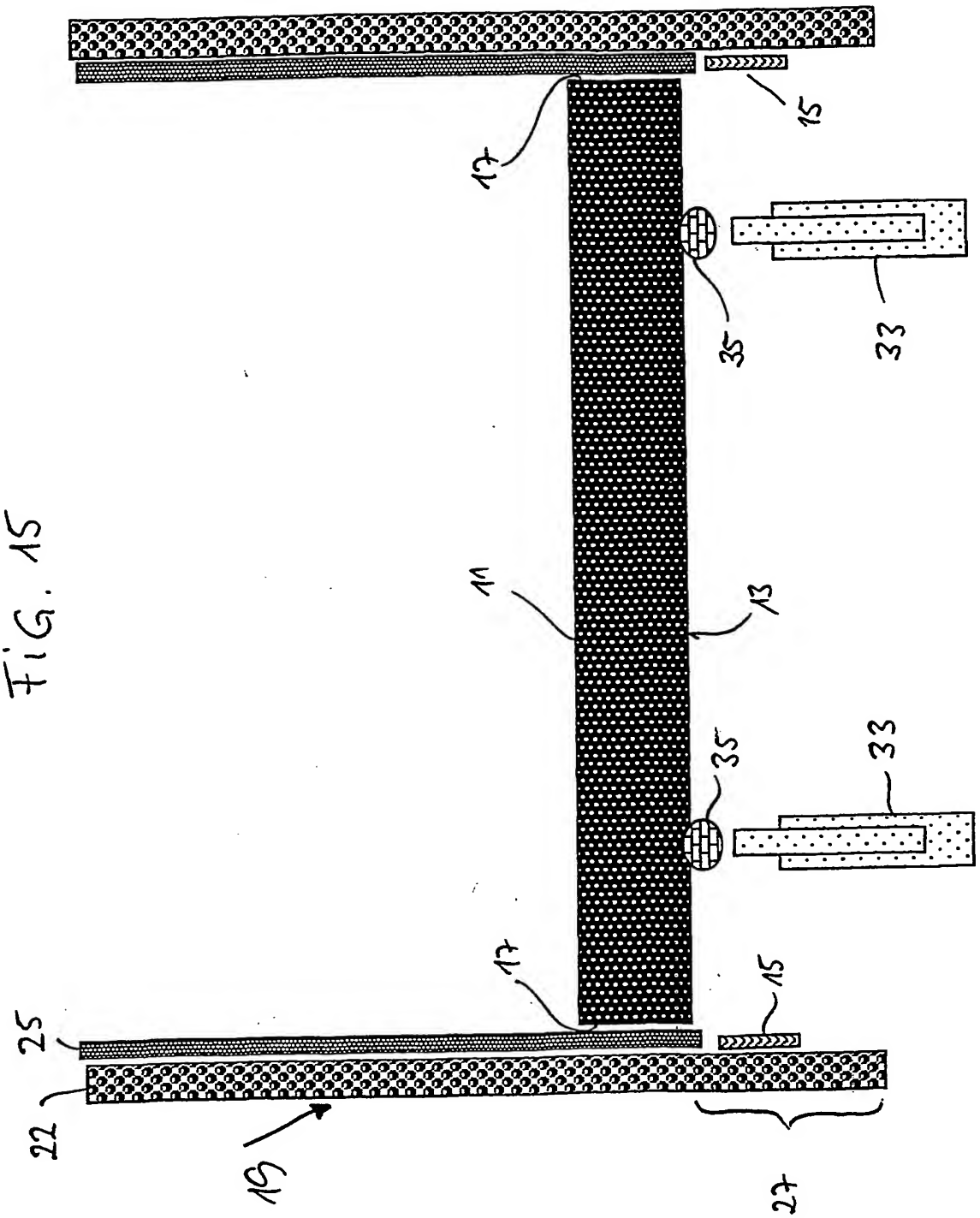


FIG. 15

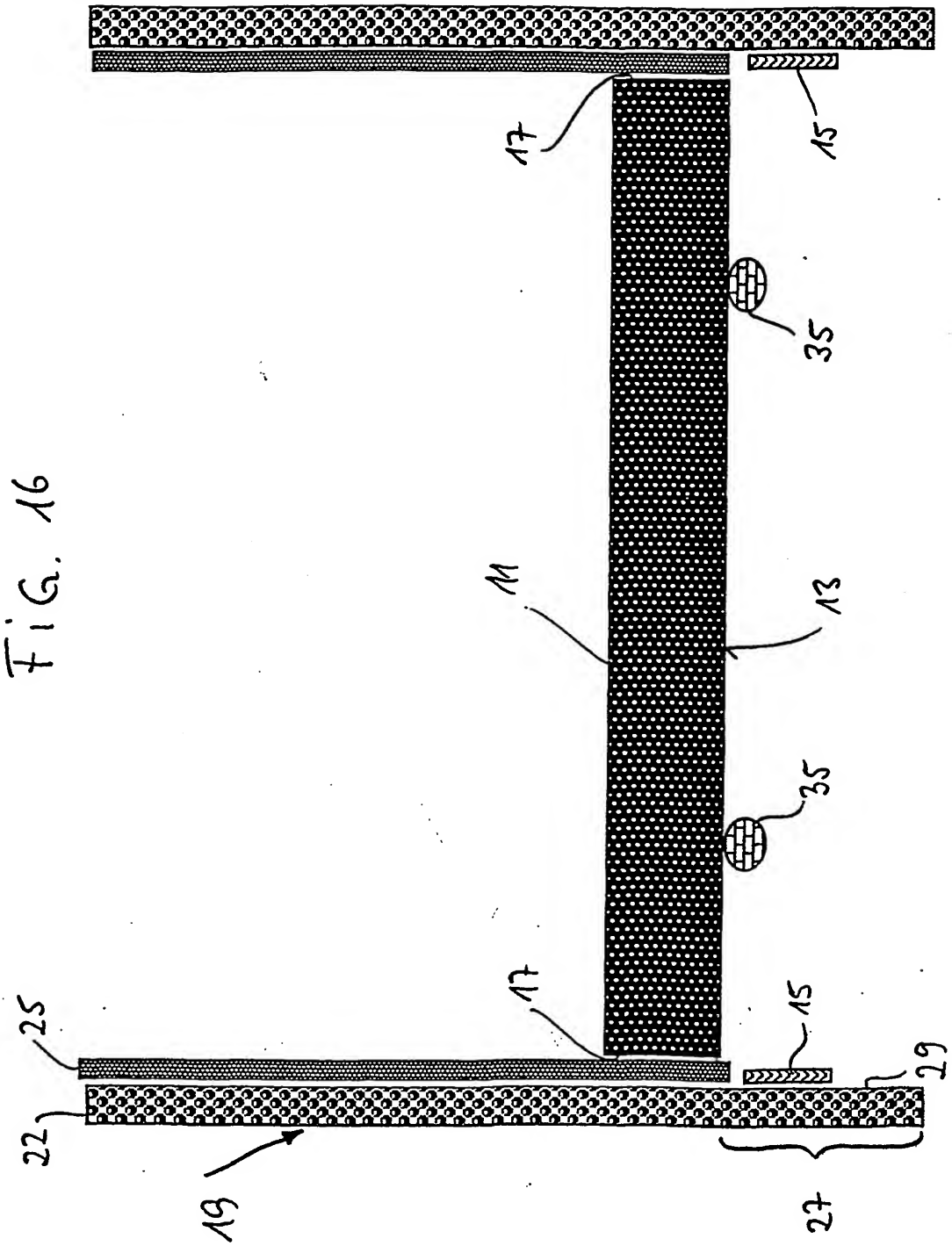


FIG. 16

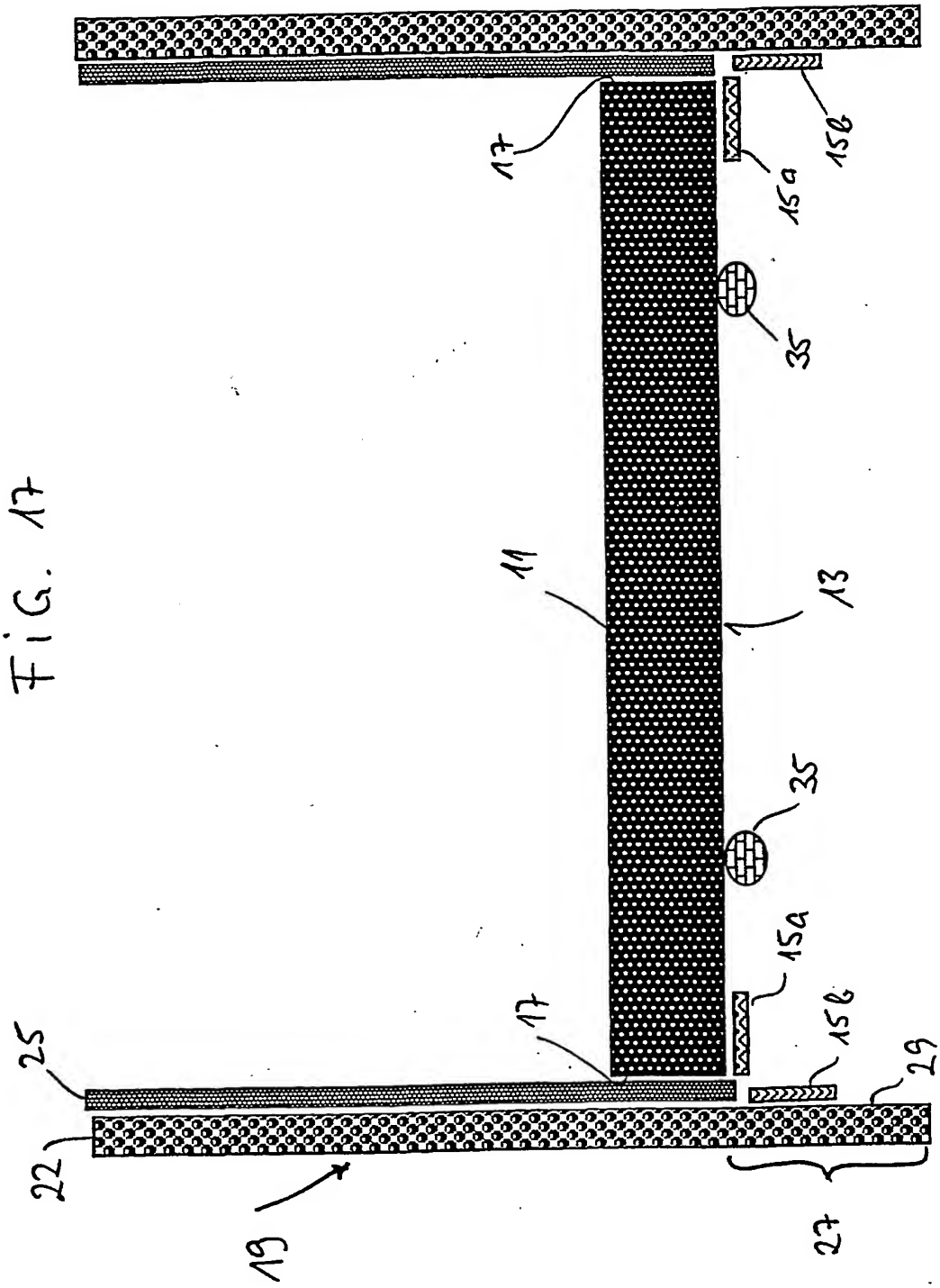


FIG. 17

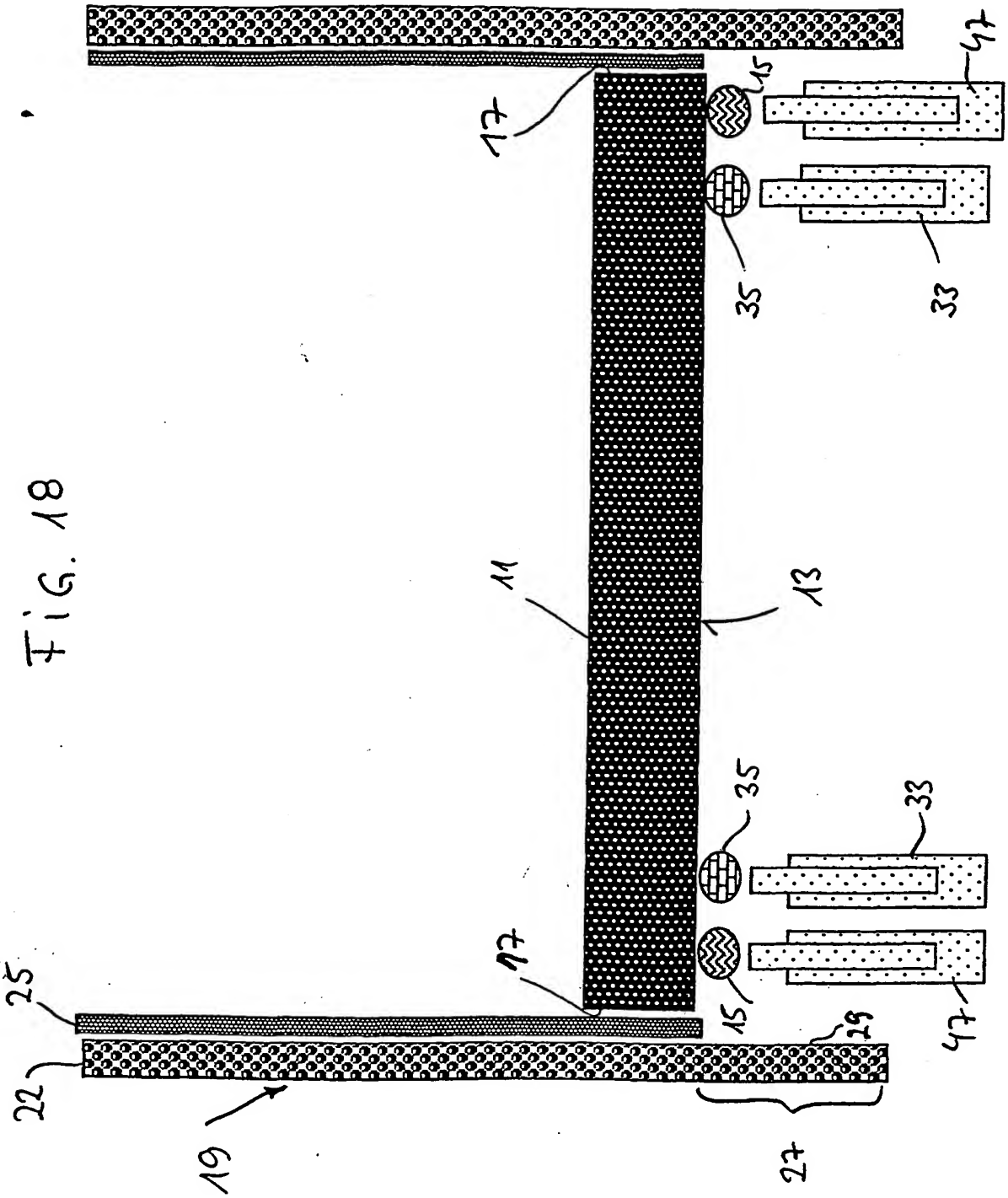


FIG. 18

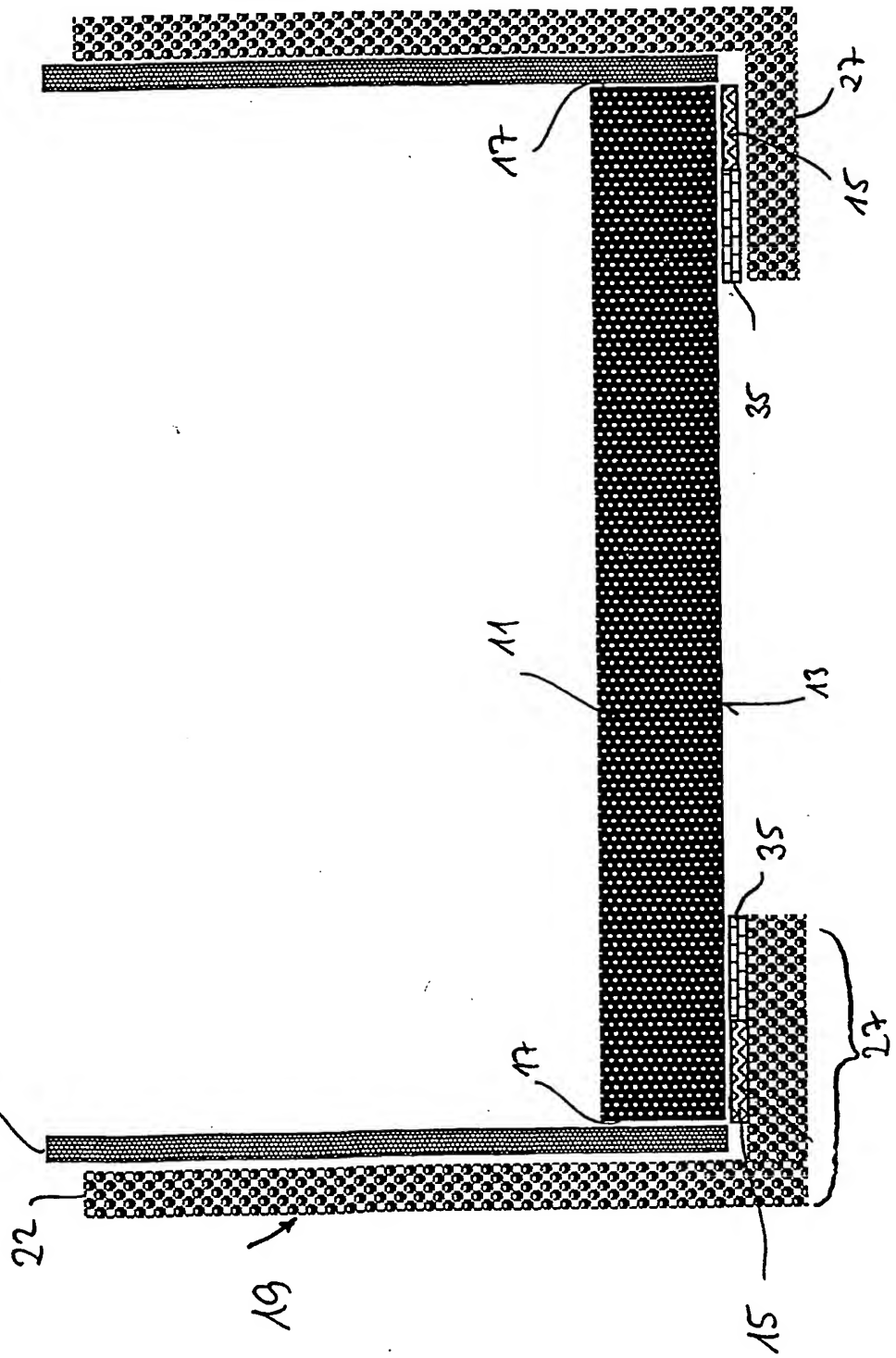


Fig. 19

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(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **HAIMERL, Franz, Xaver** [DE/DE]; Egerländerstrasse 2, 82393 Iffeldorf (DE).

(74) Agent: **HIRSCH, Peter**; Klunker, Schmitt-Nilson, Hirsh, Winzererstrasse 106, 80797 München (DE).

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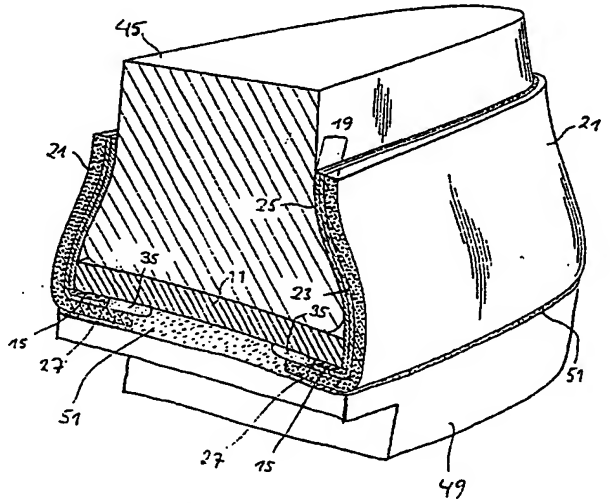
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(88) Date of publication of the international search report:
2 May 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FOOTWEAR WITH A SEALED LASTING ALLOWANCE AND PROCESS FOR ITS PRODUCTION



(57) Abstract: Cement-lasted footwear having an upper (19), which is constructed with an outer material (21) and with a waterproof functional layer (23) arranged on the inner side of the outer material (21) and has a lasting allowance (27) on the sole side, and a sole construction which has an outsole (49) and an insole (11) with an insole underside (13) and an insole center, wherein two lasting-cement zones adjacent to one another in the direction of the center of the insole are provided, of which a first is formed with a reactive hot-melt adhesive (15) which brings about waterproofness when in the reacted state, and the second is formed with a quick-bonding fastening adhesive (35), and at least the first adhesive zone is is formed by a zone which is closed in the direction of the periphery of the insole and seals at least a part of the width of the lasting allowance (27).

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 01/04625

A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
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Y	column 4, line 39 -column 7, line 44; figure 1	4-6,8, 12,13, 15,16,24
Y	WO 00 24279 A (GORE W L & ASS GMBH ;HAIMERL FRANZ XAVER (DE); MEINDL ALFONS (DE)) 4 May 2000 (2000-05-04)	5,12,15
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Date of the actual completion of the international search	Date of mailing of the international search report
24 January 2002	06/02/2002

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